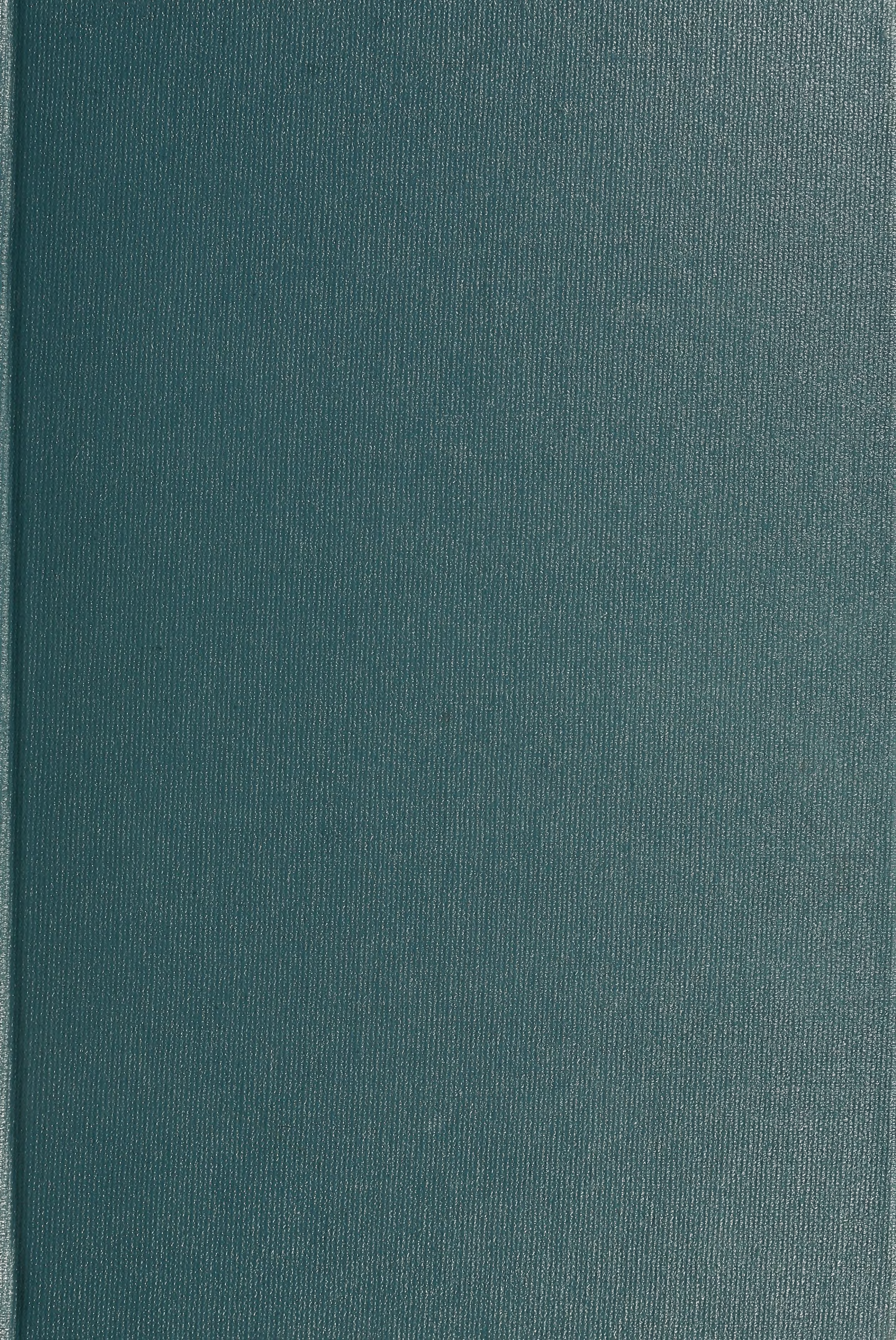








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A new species in the *Pardosa lugubris* group from Central Europe

(Arachnida, Araneae, Lycosidae)

Torbjörn Kronestedt

Kronestedt, T. (1999): A new species in the *Pardosa lugubris* group from Central Europe (Arachnida, Araneae, Lycosidae). – Spixiana **22/1:** 1-11

Pardosa baehrorum, spec. nov. is described on material from Central Europe and compared with its close allies *P. alacris* (C. L. Koch) and *P. lugubris* (Walckenaer). Distinct morphological differences between the three species mentioned are clearly expressed in the male sex, notably in secondary sexual characters. *P. baehrorum* has hitherto been found only in drained flood plain woods ('Auwälder') in southern Germany and Austria.

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Introduction

The courtship behaviour in *Pardosa lugubris* (Walckenaer), *P. alacris* (C. L. Koch) (sub *P. pseudolugubris* Wunderlich) and two allied, by then formally unnamed species were studied in southern Germany by Gabriele Töpfer-Hofmann some years ago (Töpfer 1990). One of the formally undescribed species is known as *P. 'saltans'* sensu Töpfer-Hofmann & von Helversen (1990) (formal description will follow: Töpfer-Hofmann, Cordes & von Helversen in prep.), while the other one is *P. baehrorum,* spec. nov., described below[1].

Wunderlich (1984) described *Pardosa pseudolugubris* on material from various parts of Europe. This species is morphologically similar to *P. lugubris* (Walckenaer), distinct differences between the two species so far being disclosed in the male sex only (Wunderlich 1984). Recently, Kronestedt (1992) presented arguments that *P. pseudolugubris* was previously described under the name *Lycosa alacris* C. L. Koch, 1833 (cf. also Töpfer-Hofmann & von Helversen 1990).

Pardosa baehrorum was first discerned as a separate species on morphological grounds some years ago by Dr. Barbara Baehr from material collected in Bavaria. Also this species exhibits a strong similarity to *P. lugubris* in the configuration of the male and female copulatory organs. The male of this new species is, however, clearly separable from those of *P. lugubris* and *P. alacris* in certain somatic characters.

The males of *Pardosa baehrorum* from the type locality were collected together with females. This locality, however, also harboured *P. lugubris.* While the males are easy to separate, no distinct character gap could be found between the females. Measuring of tibia I length/carapace length and tibia IV length/carapace length ratios, respectively, and length/width ratios of epigynes did not point at any clear difference in proportions among the females from the *baehrorum* type locality. Because of the small

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[1] The name *"baehrorum"* was given by Kronestedt (in litt.) and used by Töpfer-Hofmann & von Helversen (1990) who expressedly declared that its mentioning was not a formal introduction of a new name. The name has also appeared in Blick & Scheidler (1991) and Buchar & Thaler (1997).

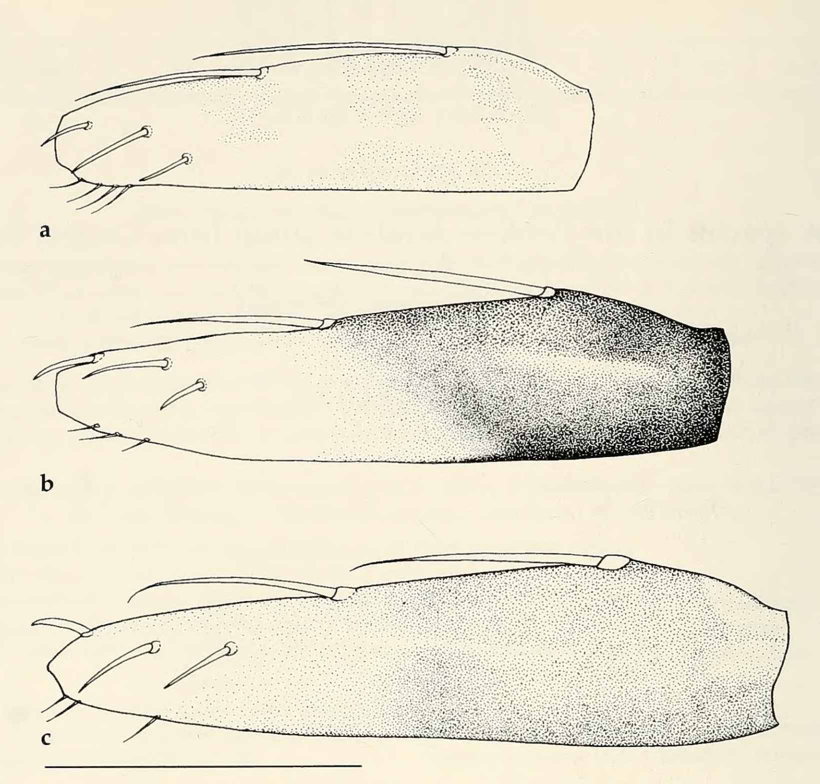


Fig. 1. Right male first femur, prolateral view, showing pigmentary pattern. **a.** *Pardosa baehrorum*, spec. nov. (DE: Bavaria). **b.** *P. alacris* (C. L. Koch) (SE: Skåne). **c.** *P. lugubris* (Walckenaer) (SE: Dalarna). Scale: 1 mm.

body length of the *P. baehrorum* males, conspecific females were expected to be small. Below is given a description of the smallest female available from the *baehrorum* type locality, here regarded to be conspecific with the male. This female has a light yellowish colour of the legs (comparable with conspecific males) while *lugubris* females have the yellowish leg colour with a slightly more brownish tinge. Discovery of a local, "pure" population of *P. baehrorum* is needed in order to get a better characterization of the female.

Due to the sharing of characteristics in the copulatory organs (e. g. shape of embolus and terminal apophysis), all above-mentioned species are assigned to a separate group of species, the *Pardosa lugubris*-group (Töpfer-Hofmann & von Helversen 1990).

Material and methods

The description is based on alcohol material. For comparison, material of *P. alacris* and *P. lugubris* from Germany (DE) (Bavaria) and *P. alacris* from Sweden (SE) (province of Skåne) was used. Moreover, material of *P. lugubris* from different parts of Sweden was studied. Occasional observations on the courtship behaviour in males assigned to *P. lugubris* from the Stockholm area (province of Uppland) demonstrated that this material clearly belongs to *P. lugubris* s. str., i. e. the species without any conspicuous visual stereotypic component in its courtship behaviour (in accordance with Töpfer 1990, Vlèček 1995, Töpfer-Hofmann et al. in prep.).

Measurements refer to specified individuals and are given in mm except for eyes. Eyepiece micrometer units (given for eyes) can be converted to mm by dividing by 80. Body parts for scanning electron microscopy were taken from preserved specimens, dehydrated in ethanol, transferred to and stored in xylene, air-dried, mounted on stubs, sputter-coated with gold and examined in a Philips SEM 515.

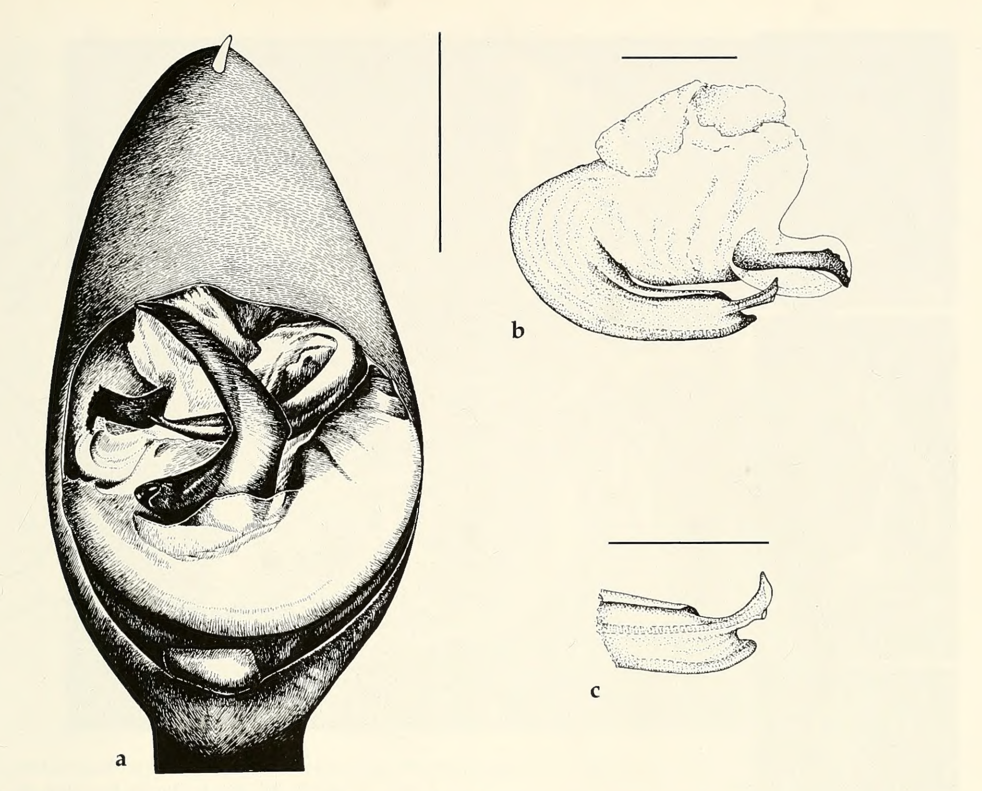


Fig. 2. *Pardosa baehrorum*, spec. nov. (DE: Bavaria). **a.** Right male palp, ventral view. **b.** Terminal part with embolus of left male palp, viewed from in front. **c.** Tip of left embolus, viewed from in front. Scales: 0.25 mm (**a**), 0.1 mm (**b, c**).

Deposition of material

CTh Collection of K. Thaler, Zoologisches Institut, Universität Innsbruck, Innsbruck
NRS Swedish Museum of Natural History (Naturhistoriska riksmuseet), Stockholm
SMF Forschungsinstitut Senckenberg, Frankfurt/M.
ZSM Zoologische Staatssammlung, Munich

Pardosa baehrorum, spec. nov.

Figs 1a, 2, 3a-e, 4, 5a, 6a, 7

Holotype: ♂, from Germany: Bavaria, Pupplinger Au at River Isar (south of Munich), 13.V.1983 (M. Baehr), deposited in ZSM.

Diagnosis. Males differ from *P. alacris* and *P. lugubris* by shorter legs (cf. Fig. 9), by leg femora being yellowish with more or less distinct darker (greyish) annulation (cf. Figs 1a-c), by distal portion of cymbium being short (cf. Figs 6a-c), and by entire cymbium being blackish. No characters have so far been found for unambiguously distinguishing the females.

Description

Male (holotype). Total length 4.0; carapace 2.20 long, 1.60 wide.

Carapace. Brownish, with distinct light brown median band and more or less distinct more or less broken lateral bands. Sides of thoracic part with recumbent dark (most numerous) and lighter hairs.

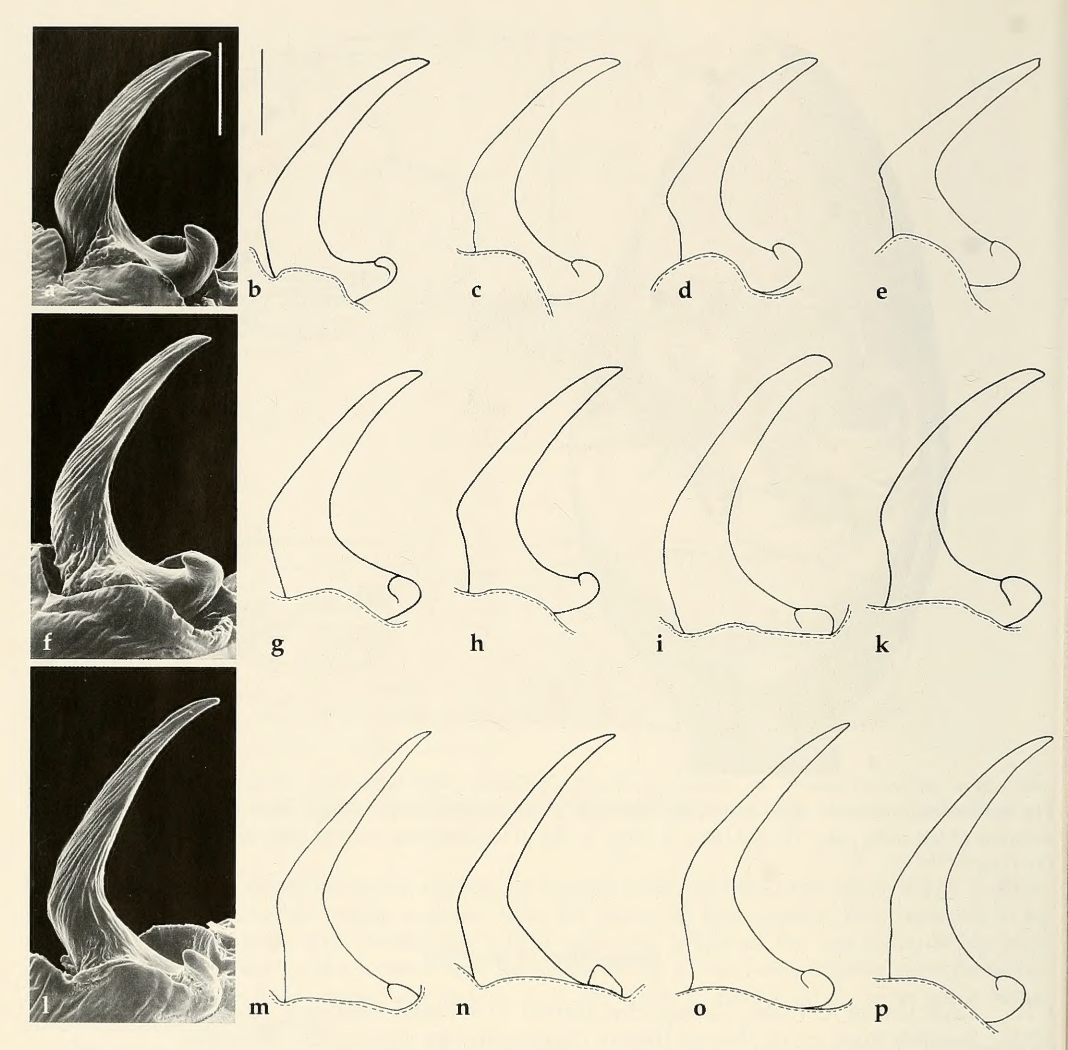


Fig. 3. Tegular apophysis of left male palp. **a-e.** *Pardosa baehrorum* spec. nov. (**a-d**, DE: Bavaria; **e**, AT: Niederösterreich). **f-k.** *P. lugubris* (Walckenaer) (**f-h**, DE: Bavaria; **i, k**, SE: Uppland). **l-p.** *P. alacris* (C. L. Koch) (**l-n**, DE: Bavaria; **o, p**, SE: Skåne). Scales: 0.1 mm.

Median band and lateral bands with recumbent whitish hairs. White hairs along carapace margin. Clypeus yellowish to light greyish brown. Chelicerae yellowish to greyish brown, with sooty longitudinal stripes proximally, fronto-distally more or less sooty; furnished with long and short dark hairs. Sternum light to greyish brownish, sometimes with indistinct yellowish median stripe; furnished with recumbent light and fewer erect dark hairs.

Eyes. Width of row I 36 (slightly procurved as seen from front), row II 55, row III 70, row II-III 54. Diameter of AME 8, ALE 7, PME 21, PLE 17. Distance between AME 5, between AME and ALE 2.

Abdomen. Dorsally brownish with greyish-bordered brownish lanceolate stripe and rearwards with some greyish transverse bars. Sides of abdomen mottled in greyish and brownish. Venter yellowish to greyish brown with greyish spots. Dorsum and sides with whitish hairs, in darker (greyish) parts also with dark hairs. Venter with numerous recumbent dark hairs and fewer scattered, more erect, stouter short dark hairs (*alacris* with recumbent greyish and dark and scattered, more erect dark hairs; *lugubris* with recumbent whitish hairs and scattered, more erect dark hairs).

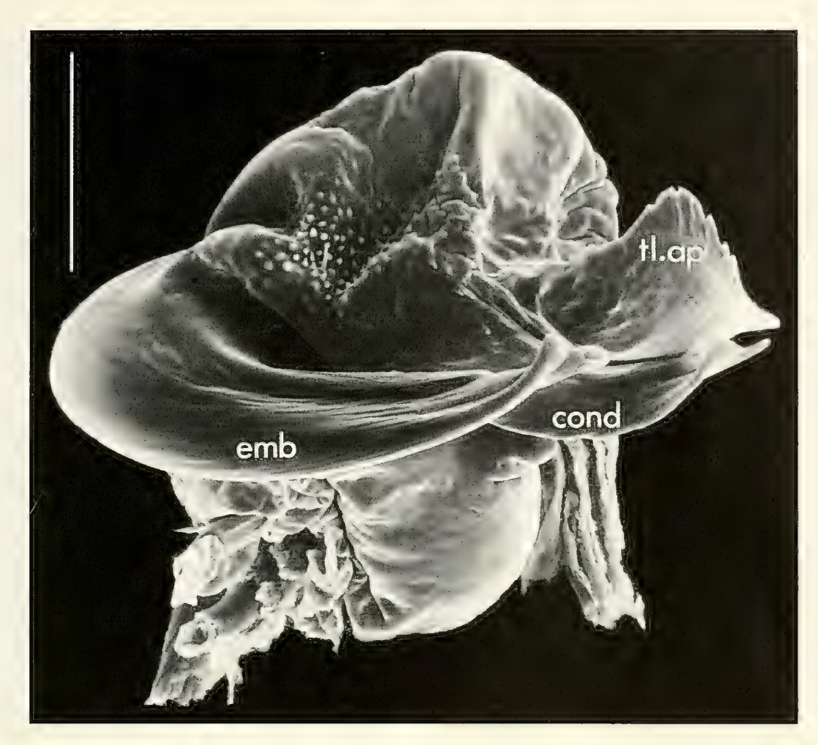


Fig. 4. *Pardosa baehrorum*, spec. nov. (DE: Bavaria). Terminal part of left male palp with embolus *(emb)*, conductor (*cond*) and terminal apophysis *(tl. ap)*. Scale: 0.1 mm.

Legs. Yellowish, with more or less sooty annulation present in femora (visible mainly on dorsal side) and, very indistinct, in tibiae and metatarsi. Annulation in Fe I (Fig. 1a) and II fainter and the rest of legs I and II sometimes without traces of annulation. Coxae and trochanters more or less sooty on dorsal side. Ti I lacking distal retrolateral spine.

Leg	Fe	Pt	Ti	Mt	Ta	Total
I	1.65	0.70	1.45	1.55	1.05	6.40
II	1.55	0.70	1.35	1.50	1.00	6.10
III	1.50	0.65	1.20	1.60	0.90	5.85
IV	2.00	0.75	1.75	2.50	1.20	8.20

Palp (Fig. 2a). Patella 0.45, tibia 0.45, cymbium 0.90. Femur, patella and tibia blackish brown and furnished with dark hairs. Tibia with somewhat longer dark hairs pro- and retroventrolaterally, many of them relatively stout. Cymbium comparatively short (Fig. 6a), with terminal claw. Shape of tegular apophysis (Figs 3a-e) slightly variable [cf. *P. lugubris* Figs 3f-k (shape variable), and *P. alacris* Figs 3l-p (shape variable, anteriorly directed branch often narrower than in *baehrorum* and *lugubris*)]. Terminal apophysis like a smoothly curved, corrugated, sclerotized lamina, anterior rim in part serrated (Figs 2b, 4, 5a). Most of embolus relatively wide, distal part narrow and curved (Figs 2b, c, 5a), similar to *lugubris* (cf. Fig. 5b) [distal part in *alacris* narrower (cf. Figs 5d, e) compared with *baehrorum* and *lugubris*].

Female (same locality as holotype). Total length 5.6, carapace 2.35 long, 1.80 wide.

Carapace. Brownish with yellowish median band and broken lateral bands. Sides of thoracic part with short recumbent dark hairs, nearest to lateral bands and in these with recumbent whitish hairs. Median band with recumbent white pubescence. Clypeus yellowish. Chelicerae yellowish with darker longitudinal stripes; furnished with whitish and a few darker hairs. Sternum greyish brown with lighter indistinct median stripe in anterior part.

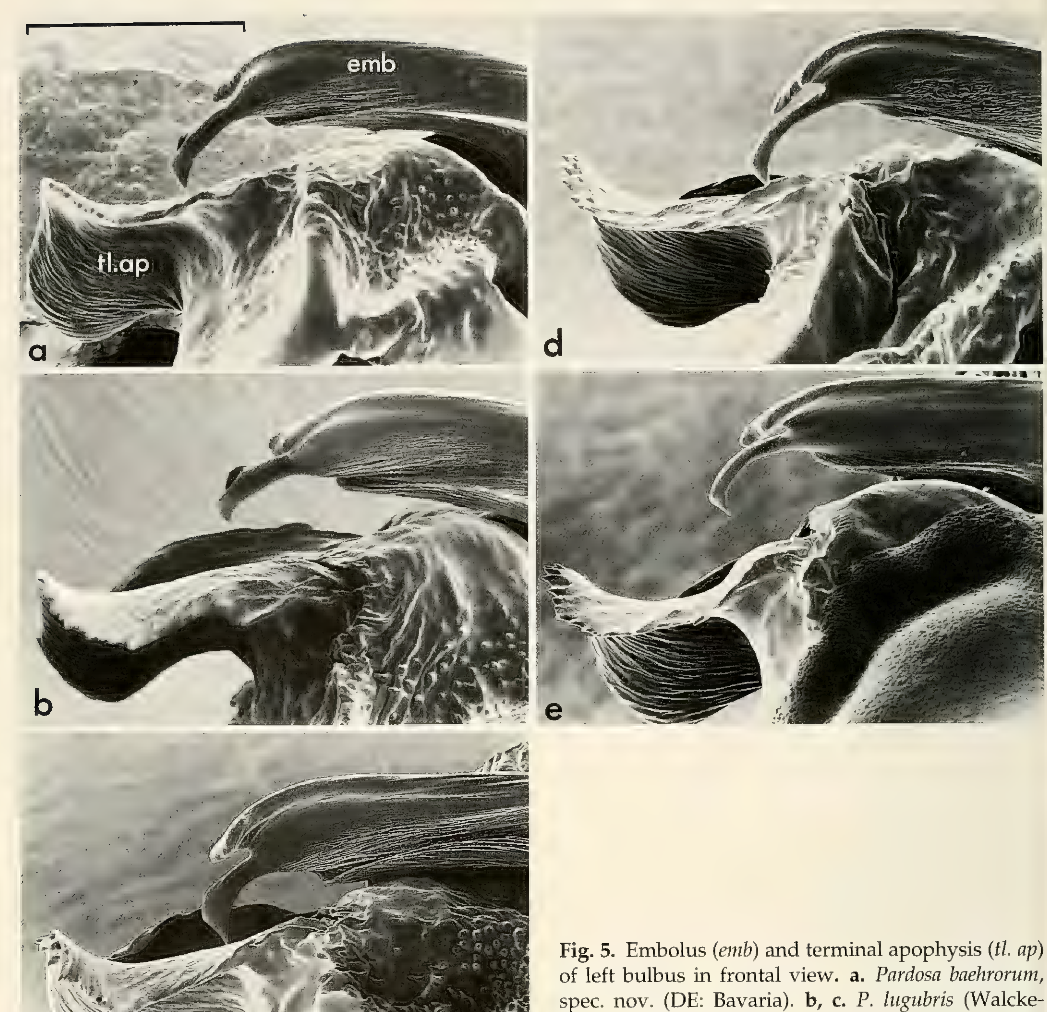


Fig. 5. Embolus (*emb*) and terminal apophysis (*tl. ap*) of left bulbus in frontal view. **a.** *Pardosa baehrorum*, spec. nov. (DE: Bavaria). **b, c.** *P. lugubris* (Walckenaer) (**b**, SE: Dalarna; **c**, SE: Uppland). **d, e.** *P. alacris* (C. L. Koch) (**d**, DE: Bavaria; **e**, SE: Skåne). Scale: 0,1 mm.

Abdomen. Dorsally with brownish lanceolate stripe and obscure brownish/greyish pattern and pubescence of recumbent whitish hairs and short stouter dark hairs. Sides of abdomen dark greyish with white pubescence. Venter brownish with recumbent whitish pubescence and few scattered erect dark hairs.

Legs. Yellowish with greyish annulation/spotting (except tarsi). Ti I lacking distal retrolateral spine.

Leg	Fe	Pt	Ti	Mt	Ta	Total
I	1.80	0.80	1.60	1.45	0.95	6.60
II	1.75	0.80	1.40	1.45	0.90	6.30
III	1.70	0.75	1.30	1.65	0.90	6.30
IV	2.30	0.85	2.00	2.85	1.20	9.20

Epigyne (Fig. 7). Septum (incl. septal ridge) shaped like an inverted T. Anterior transverse pockets clearly separated. Shape of epigyne similar to that in *P. lugubris* (Fig. 8b) and *P. alacris* (Fig. 8c). In

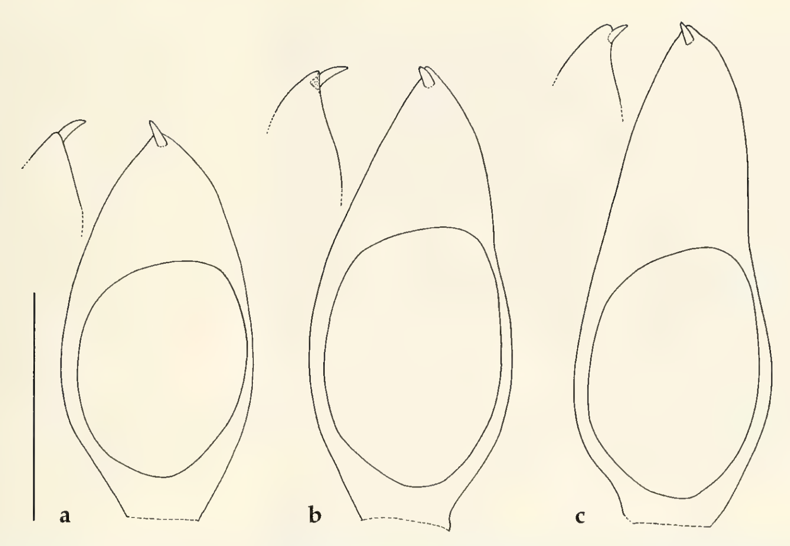


Fig. 6. Left cymbium in ventral view (insets: apical part in prolateral view). **a.** *Pardosa baehrorum*, spec. nov. (DE: Bavaria) **b.** *P. lugubris* (Walckenaer) (SE: Uppland). **c.** *P. alacris* (C. L. Koch) (SE: Skåne). Scale: 0.5 mm.

contrast to *P. baehrorum*, the septal ridge in *P. alacris* is often characteristically widened anteriorly (cf. Fig. 8c; septal wrinkles are also visible in dried material under a stereomicrosope). Among the females initially (and intuitively) attributed to *baehrorum*, the length of the epigynal septum was considerably longer in relation to the width of the posterior transversal part of the septum (cf. Fig. 7). However, no distinct "gap" in this relation was found when comparing with females attributed to *lugubris* [many of which have the length of the epigynal septum shorter than (or equal to) the width of the posterior transversal part of the septum: Fig. 8b]. Fig. 8a shows the epigyne from a female of uncertain identity (*baehrorum* or *lugubris*). An account of the configuration of the copulatory ducts and receptacula will have to wait until females from a "pure" population of *baehrorum* becomes available.

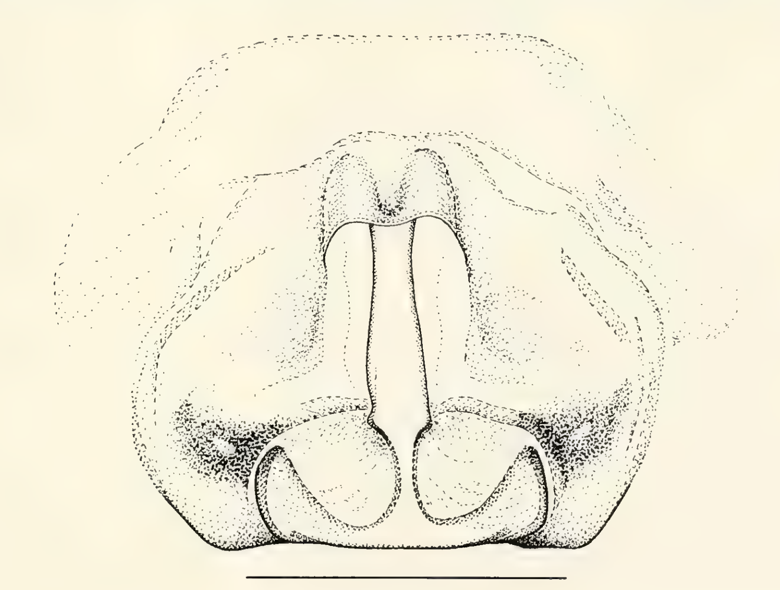


Fig. 7. *Pardosa baehrorum*, spec. nov. Epigyne. Scale: 0.25 mm.

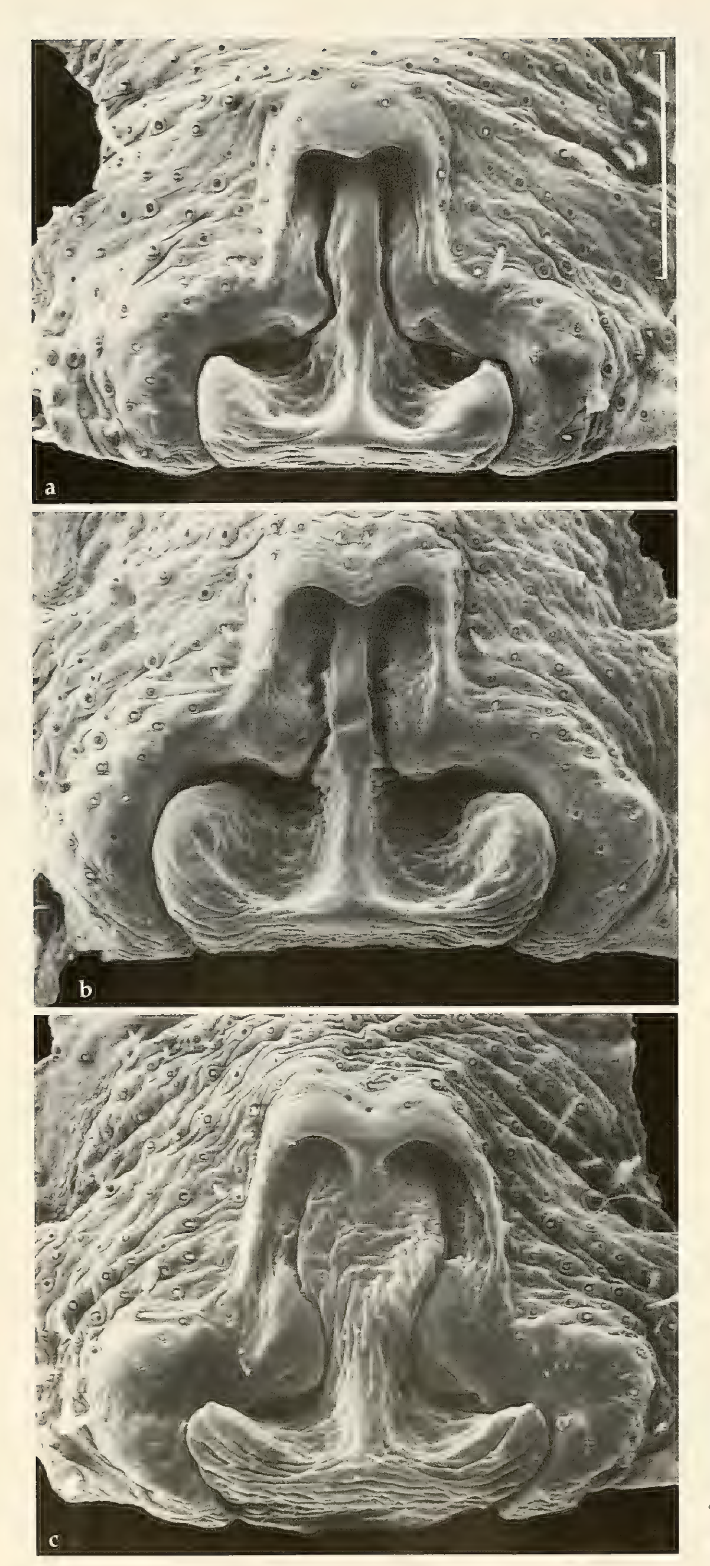


Fig. 8. Epigyne. **a.** *Pardosa* sp., identity uncertain, carapace length 2.45 (DE: Bavaria, Pupplinger Au). **b.** *P. lugubris* (Walckenaer) (SE: Uppland). **c.** *P. alacris* (C. L. Koch) (DE: Bavaria). Scale: 0.2 mm.

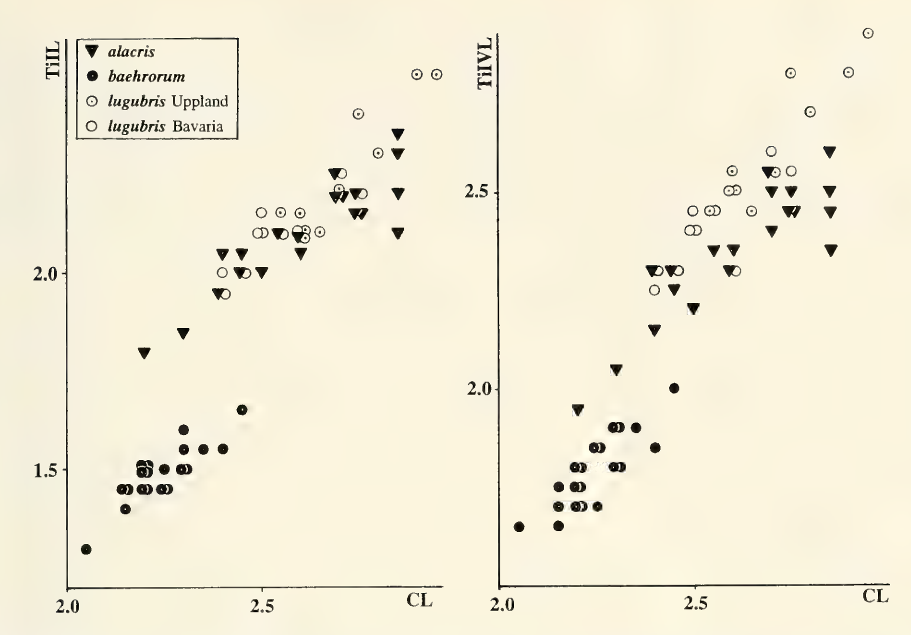


Fig. 9. Tibia I length (TiIL) and tibia IV length (TiIVL), respectively, versus carapace length (CL) in males of *Pardosa baehrorum*, spec. nov. (DE: Bavaria), *P. alacris* (C. L. Koch) (different localities in DE: Bavaria), and *P. lugubris* (Walckenaer) (localities in DE: Bavaria and SE: Uppland).

Size variation. Carapace lengths of males measured: males 2.05-2.45 (N=20). Tibia I and tibia IV lengths, respectively, versus carapace length given in Fig. 9. The relative length of leg I in the *baehrorum* males is notably shorter compared with the condition in the *alacris* and *lugubris* males.

The size variation of *baehrorum* females is excluded for reasons given above. The carapace lengths of the available females of *baehrorum+lugubris* from Pupplinger Au (N=22) were between 2.35 and 3.05, the *baehrorum* females likely to be among the smaller specimens. For comparison, the carapace lengths of a sample of 10 *lugubris* females from SE: Uppland ranged between 2.60 and 3.10.

Material examined. AUSTRIA. *Niederösterreich.* Orth, Ellender Haufen (E of Vienna), 1972-73 (H. M. Steiner, CTh), 8♂♂ (see also Buchar & Thaler 1997). – GERMANY. Bayern, Pupplinger Au at River Isar (S. of Munich), 24.VI.1982, 13.V., 13.VI. & 8.VII.1983 (M. Baehr, NRS, SMF, ZSM) 24♂♂, 1♀ [holotype and ♀ in ZSM]; Aumühle at River Isar, 26.V.1982 (M. Baehr, ZSM), 3♂♂.

Distribution and habitat. Austria and Germany (Fig. 10). So far *P. baehrorum* has been met with in a type of habitat which in German is named 'Auwald' [=drained flood plain wood (English term used in Ellenberg 1988)]. This type of habitat (also called bottomland forest) is endangered in Central Europe (Thaler & Steiner 1989, with further references). It remains to be found whether this species shows a preference for this habitat or if it has a wider habitat amplitude.

Etymology. The specific name is a patronym in honour of Dr. Martin Baehr, collector of part of the original material, and Dr. Barbara Baehr who drew my attention to the material from the type locality.

Discussion

The species here dealt with show that the morphology of the copulatory organs may in certain cases be up to its limits as a tool for separating species in Lycosidae. Additional characteristics, as size proportions of body parts, coloration and/or pilosity may in instances be more informative for recognizing species. Such characteristics are usually expressed as secondary sex characters in the male only.

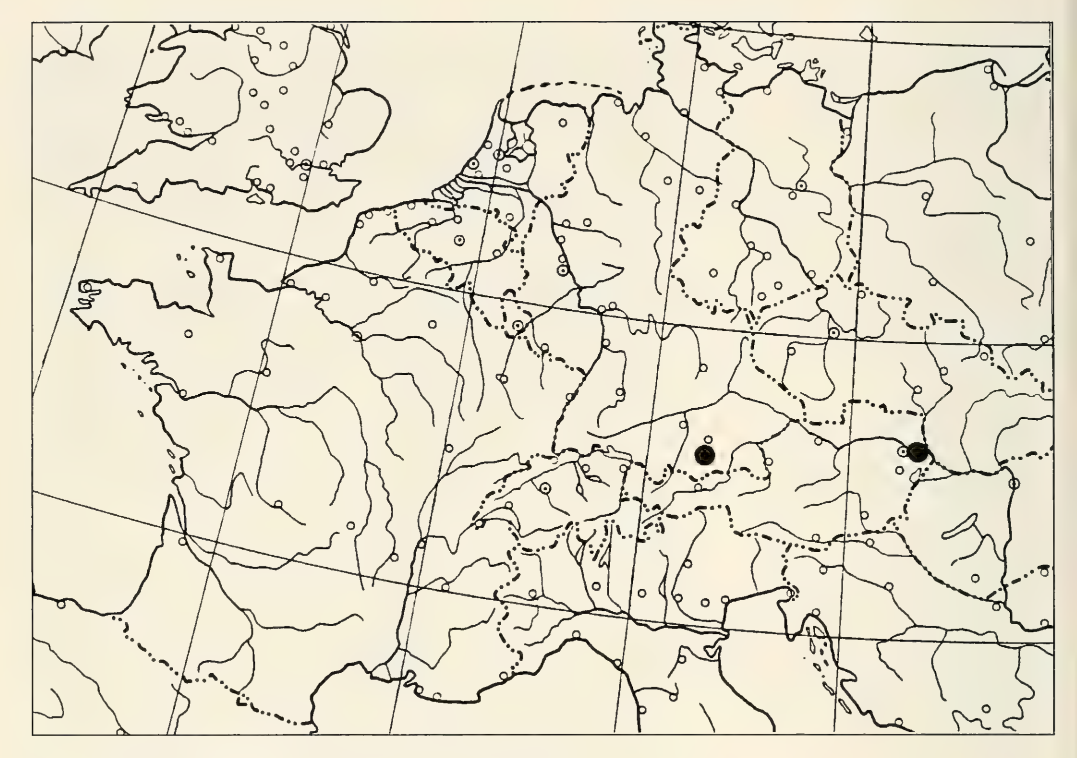


Fig. 10. Collection localities of *Pardosa baehrorum*, spec. nov.

The male of *Pardosa baehrorum* is clearly separable from the males of *P. alacris* and *P. lugubris* by the somatic characters mentioned in the diagnosis, i. e. the relative leg lengths as well as the coloration and form of cymbium. Otherwise, the configuration of the palpal organs of the three species is very similar. The tegular apophysis in all three species is subject to considerable intraspecific variation. Wunderlich (1984) noted that the anteriorly directed branch of the tegular apophysis in *alacris* is often but not always narrower than in *lugubris*. Also in the present material, no absolute difference in this respect was found. The embolus exhibits a certain but similar complexity apically in all three species. In this respect, *P. alacris* differs by its distalmost part being somewhat longer and narrower than the corresponding part in *P. baehrorum* and *P. lugubris*.

Töpfer (1990) and Töpfer-Hofmann & von Helversen (1990) stated that the courtship behaviour in *P. alacris*, *P. baehrorum*, *P. lugubris*, and *P. 'saltans'* (sensu Töpfer-Hofmann & von Helversen, 1990), respectively, is distinct, further supporting their separation at the species level. These ethological characteristics are highly significant as the four species are sympatric, thus acting as part of the specific mate-recognition system. A comparative study of the courtship behaviour in three of these species (*P. baehrorum* not included) (Vlèček 1995) further supported the significant ethological differences between the species. The courtship behaviour in all four species will be treated by Töpfer-Hofmann, Cordes & von Helversen (in prep.). A considerable variation in courtship behaviour between different populations of *P. lugubris* was accounted for by Vlijm & Dijkstra (1966), raising a suspicion that more than one biospecies were involved in their study and at that time collectively included under this name.

Pardosa lugubris has previously, together with *P. amentata* (Clerck), been assigned to the *amentata* group (Zyuzin 1979, Wunderlich 1984). Because of the configuration of the terminal part of the bulbus (*P. amentata*: Wunderlich 1984, fig. 33, and own obs.), these two species do not appear to be morphologically closely allied. On the other hand, *P. caucasica* Ovtsharenko has characters (shape of embolus, terminal apophysis, epigyne) meriting its inclusion in the *lugubris* group (Ovtsharenko 1979 and own obs.).

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Buchbesprechungen

1. Storch, V. & U. Welsch: Systematische Zoologie, 5. bearbeitete und erweiterte Auflage. – G. Fischer Verlag, Stuttgart, 1997, XXIII + 804 S., 448 Abb. ISBN 3-437-25160-0.

Die neue Auflage dieses bekannten und bewährten Lehrbuches erfreut wieder durch seine klare und übersichtliche Darstellung. Es wurden wieder viele Veränderungen und Korrekturen, die durch die Weiterentwicklung der Zoologie bedingt sind, eingearbeitet. Die schon bekannten Darstellungen der Lebensräume wurden wieder vermehrt. In ihnen wird veranschaulicht, daß jedes Tier nur in seiner Umwelt zu verstehen ist. Leider muß aber auch Kritik angebracht werden. Zum Beispiel die Eingliederung der Echiurida in die Annelida erscheint mir nach wie vor nicht gerechtfertigt. Eher würde es unseren heutigen Vorstellungen entsprechen, die Pogonophoren in die Nähe der Annelida, oder in diese, einzuordnen. Die Darstellung und Betonung des Archicoelomaten-Konzeptes erscheint mir überholt, es fehlen andererseits aktuelle Erörterungen zum Beispiel über die Coelomverhältnisse im Tierreich. Mehrfach werden in dem Buch systematische Einheiten behandelt, von denen bekannt ist, daß sie veraltet sind: es gibt zwar beispielsweise noch kein allgemein anerkanntes System der Protozoa, aber die vorgestellte Gliederung mit den traditionellen Klassen (Flagellata, Rhizopoda, Sporozoa und Ciliata) ist sicherlich überholt. Es mag zwar Geschmacksache sein, die Reptilien, Apterygota oder Pelmatozoa als Taxon überhaupt zu verwenden, aber wenn man es macht, muß der Kenntnisstand über die phylogenetischen Zusammenhänge doch irgendwie dargestellt werden. Ob die neu entdeckten Cycliophora (*Symbion pandora*) wirklich ein eigener Stamm und ob die Concentricycloidea (*Xyloplax* sp.) eine eigene Klasse darstellen, ist zu unsicher bzw. umstritten, um sie in einem Lehrbuch kommentarlos aufzunehmen. Für eine neue Auflage würde ich mir eine gründlichere Diskussion der Verwandtschaftsverhältnisse wünschen, in der aktuelle Konzepte der zoologischen Systematik dargestellt und diskutiert werden, damit das Buch dem Titel "Systematische Zoologie" gerecht wird. Aber auch in der jetzigen Form ist das Werk nach wie vor, zum Beispiel als Nachschlagewerk, für alle naturkundlich Interessierten bestens zu empfehlen.

K. Schönitzer

2. Weitschat, W. & Wichard, W.: Atlas der Pflanzen und Tiere im Baltischen Bernstein. – Verlag Dr. Friedrich Pfeil, München, 1998, 256 S., ISBN 3-931516-45-8.

Die Faszination, die von dem gelblich bis rötlich schimmernden "Stein" ausgeht, hat zu Handelsbeziehungen der 'fellbehangenen Bewohner' des Ostseeraumes bis zu den Hochkulturen des Mittelmeeraumes geführt. Dieses auffallend leichte 'Gold des Nordens' erweckte durch die darin erkennbaren Tiere und Pflanzen oder Teile von ihnen das besondere Interesse der Wissenschaft. Da es sich um ein fossilisiertes Baumharz handelt, sind die eingeschlossenen Organismen, festgeklebt und übergossen, Zeugen einer vergangenen Zeit, die bereits zu utopischen Spekulationen der Roman- und Kinowelt geführt haben. In dem vorliegenden großformatigen Werk werden dagegen von den beiden Autoren, den Spezialisten in der Bernsteinkunde, sachlich die allgemeinen Grundlagen mit Hinweisen zur Entstehung, zum Alter, zu den Lagerstätten, zur Alterung der Stücke und biologischen sowie biogeographischen Phänomenen unter besonderer Berücksichtigung des Baltischen Bernsteins vorgestellt. Diese sicher besonders informativen Eingangskapitel enthalten neben der Fülle neuer Erkenntnisse, die auch durch die umfassende Ausbeutung der Grube bei Kaliningrad möglich geworden sind und die Einsicht in zahllose Privatsammlungen notwendig machten, auch ungeklärte Phänomene wie die Frage nach dem Harzlieferanten (Kiefer ?) oder der gefundenen Larven von Fließwasserinsekten. Der spezielle Teil erfaßt in systematischer Folge die bisher im Baltischen Bernstein (um 50 Mill. Jahre alt) nachgewiesenen Pflanzen und Tiere, die in einer fachlichen und allgemein verständlichen Art vorgestellt werden, vielfach auch mit bisher nachgewiesenen Artenlisten. Auf 91 Tafeln werden atemberaubende Bilder in die Vergangenheit übermittelt, die Details zeigen, die unvorstellbar scheinen und sogar Artvergleiche z.B. mit heute existierenden Insekten zulassen. Leider fehlen Größenmaßstäbe der Objekte, die die Detailerkenntnis noch verstärken würden. Eingesponnene Insekten in Spinnennetzen, phoretische Pseudoskorpione und Milben vervollständigen den Blick in ein erstarrtes Lebensbild der Vorzeit. Pflanzenblüten, von parasitischen Würmern bis zur Eidechse, Vogelfeder und Säugetierhaar mit anhaftendem Lausei wird hier ein Kaleidoskop vorgeschichtlichen Lebens in überwältigenden Bildern vorgestellt. Das Nebeneinander von verwandten Arten der klimatisch gemäßigten Zone und tropisch/subtropischen Arten führt heute noch zu heftigen Diskussionen. Dieses Buch beeindruckt durch seine allgemeinverständliche Dokumentationsweise und überwältigt durch seine Detailwiedergabe der Inklusen des Baltischen Bernsteins auf 609 Farbbildern.

E.-G. Burmeister

SPIXIANA	22	1	13–46	München, 01. März 1999	ISSN 0341-8391

Colombian *Anacroneuria*: Descriptions of new and old species

(Insecta, Plecoptera, Perlidae)

Bill P. Stark, Maria del C. Zúñiga, Angela M. Rojas and **Martha L. Baena**

Stark, B. P., M. C. Zúñiga, A. M. Rojas & M. L. Baena (1999): Colombian *Anacroneuria*: Descriptions of new and old species (Insecta, Plecoptera, Perlidae). – Spixiana **22/1:** 13-46

35 species of the genus *Anacroneuria* Klapálek are recorded for Colombia including following 23 species described as new: *anchicaya, azul, calima, choachi, cipriano, cordillera, forcipata, guambiana, guayaquil, meta, morena, oreja, pacifica, paez, planada, portilla, quilla, regleta, rosita, socapa, tejon, undulosa, valle.* 12 species are described from the Cordillera Occidental; 9 of these are from Rio Azul in the middle Calima river basin or other streams in the Departamento Valle del Cauca. Five species are described from sites scattered along the Cordillera Oriental and six are from the Cordillera Central. Redescriptions are given for five species previously recorded from Colombia. A neotype is designated for *A. albimacula* Klapálek and a lectotype is designated for *A. pallens* Klapálek. A provisional key for males of 31 Colombian species is presented.

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Introduction

By 1927, twenty *Anacroneuria* species already had been described from Colombia (Banks 1914, Enderlein 1909a, 1909b, Klapálek 1921, 1922, Navas 1916, 1924, 1926, 1927, Pictet 1841). Unfortunately, due to ambiguity, vagueness and incompleteness, none of these studies are particularly helpful in identifying Colombian *Anacroneuria*. Study of type material led to recognition of two synonyms and to redescriptions for three Pictet (1841) and three Enderlein (1909a, 1909b) species (Zwick 1972, 1973). Subsequent research (Benedetto, unpublished, Stark, unpublished) indicate type material for six Navas (1916, 1926, 1927) and two Klapálek (1921, 1922) species are lost. Nine of these older names are given below as nomina dubia, but a neotype is proposed for *A. albimacula* Klapálek because it is the generic type species.

Since 1927, only one *Anacroneuria* species has been described from Colombia (Rojas & Baena 1993) but Stark (1995) recorded 31 species from Venezuela including 18 new to science. These reports along with those dealing with related genera (Froehlich 1984, 1988, Stark 1989, 1991, 1996, Stark & Zwick 1989) reflect a renewed interest in neotropical perlid systematics.

In this study we report the status for 12 species formerly recorded in Colombia or Venezuela and provide descriptions for 23 new species. Five unassociated females are also described under informal designations. Significantly, there is little overlap among the 35 species included herein with those currently known for Venezuela (Stark 1995), however, the overlap between Colombian and Ecuadoran

Anacroneuria is quite strong (Stark, unpublished). Holotypes and paratypes are deposited in the National Museum of Natural History, Washington (USNM), the Museo de Entomología de la Universidad del Valle, Cali (MEUV), or the Stark collection at Mississippi College, Clinton (BPS). Additional material has been examined from the Museum für Naturkunde der Humboldt Universität, Berlin (MNHB), The Museum of Comparative Zoology, Harvard University (MCZ), the National Museum of Natural History, Prague (NMP), and the University of Missouri, Columbia (UMO). The following key should permit identification of males of known Colombian *Anacroneuria*.

Provisional key to known Colombian male *Anacroneuria*

1. Wings banded in amber and dark brown .... *bifasciata* (Pictet)
– Wings variable, but without bands .... 2.

2. Forewing length at least 16 mm .... 3.
– Forewing length no more than 15 mm .... 12.

3. Hammer absent .... 4.
– Hammer present .... 5.

4. Aedeagal apex projecting beyond shoulder about twice as long as wide (Fig. 58); dorsal aedeagal keel weak (Fig. 60) .... *guambiana*
– Aedeagal apex projecting beyond shoulder about as long as wide (Fig. 116); dorsal aedeagal keel absent (Fig. 118) .... *socapa*

5. Lateral aspect of aedeagal apex hatchet shaped (Fig. 103) .... 6.
– Lateral aspect of aedeagal apex somewhat scoop shaped (Fig. 84) .... 7.

6. Hammer a minute circular disc (Fig. 15); ventral aspect of aedeagal apex rounded (Fig. 17) .... *pallens* Klapálek
– Hammer thimble shaped (Fig. 101); ventral aspect of aedeagal apex notched (Fig. 102) .... *quilla*

7. Projecting portion of aedeagal apex somewhat bulbous, or trilobed (Fig. 13) .... 8.
– Projecting portion of aedeagal apex thin and hooked (Fig. 84) .... 11.

8. Aedeagal apex trilobed .... *fenestrata* (Pictet)
– Aedeagal apex simple .... 9.

9. Dorsomesal aedeagal keel Y-shaped (Fig. 90) .... *paez*
– Dorsomesal aedeagal keel composed of two narrow ridges (Fig. 14) .... 10.

10. Ventral aedeagal apex truncate, hooks slender (Fig. 12) .... *bolivari* (Banks)
– Ventral aedeagal apex rounded, hooks stout (Fig. 63) .... *guayaquil*

11. Dorsal aedeagal keel present (Fig. 109); hammer excavated (Fig. 106) .... *regleta*
– Dorsal aedeagal keel absent (Fig. 85); hammer thimble shaped (Fig. 82) .... *pacifica*

12. Dark pigment covers ocelli or area immediately anterior to ocelli (Fig. 76) .... 13.
– Ocellar region pale, or with only diffuse pigment (Fig. 51) .... 22.

13. Aedeagal tip in ventral aspect bearing three sclerotized processes (Fig. 3) .... 14.
– Aedeagal tip in ventral aspect bearing a single, sometimes notched process (Fig. 121) .... 15.

14. Wings with a transparent circular window near cord; mesoapical aedeagal lobe without keel (Fig. 5) .... *albimacula* Klapálek
– Wing membrane completely transparent; mesoapical aedeagal lobe with keel (Fig. 80) .... *oreja*

15. Aedeagal apex deeply notched .... *farallonensis* Rojas & Baena
– Aedeagal apex rounded or slightly emarginate (Fig. 121) .... 16.

16. Aedeagal apex upturned in lateral aspect at an approximate right angle (Fig. 122) .... *tejon*
– Aedeagal apex straight or only slightly upturned (Fig. 113) .... 17.

17. Dorsal aedeagal keel arcuate or triangular (Figs 30, 114) .... 18.
– Dorsal aedeagal keel composed of two more or less parallel ridges (Fig. 25) .... 20.

18. Margins of aedeagus convergent from base of hooks to near tips of hooks (Fig. 114) .... 19.
– Margins of aedeagus abruptly narrowed at midlength of hooks (Fig. 28) .... *azul*

19. Aedeagal hooks swollen and curved inward abruptly near tips (Fig. 112) .... *rosita*
– Aedeagal hooks slender and curved inward gradually (Fig. 38) .... *choachi*

20. Aedeagal apex acute (Fig. 24); subapical membranous lobes absent (Fig. 23) .... *anchicaya*
– Aedeagal apex blunt or emarginate (Fig. 73); subapical membranous lobes present (Fig. 73) .. 21.

21. Aedeagal hooks slender throughout (Fig. 73) .... *morena*
– Aedeagal hooks wider subapically (Fig. 98) .... *portilla*

22. Aedeagus very slender from base of hooks to apex (Fig. 10); hooks digitate (Fig. 8) .... 23.
– Aedeagus about as wide in subapical area as basally (Fig. 126); hooks not digitate .... 24.

23. Margins of aedeagal apex parallel (Fig. 8) .... *angusticollis* (Enderlein)
– Aedeagal apex swollen (Fig. 53) .... *forcipata*

24. Lateral aspect of aedeagal apex very narrow (Fig. 127) .... *undulosa*
– Lateral aspect of aedeagal apex relatively wide (Fig. 132) .... 25.

25. Hammer reduced to circular unpigmented spot (Fig. 47) .... 26.
– Hammer thimble shaped (Fig. 135) .... 27.

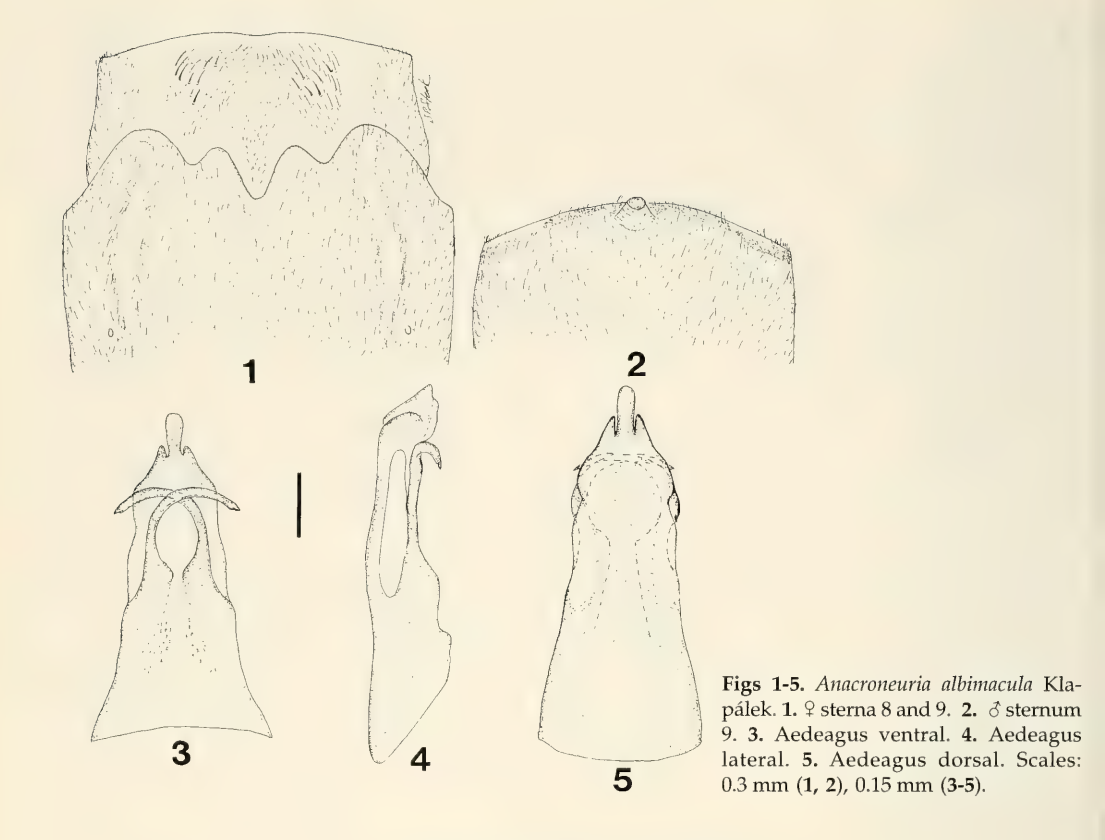
26. Dorsomesal aedeagal keel obsolete (Fig. 50) .... *cordillera*
– Dorsomesal aedeagal keel well developed (Fig. 133) .... *valle*

27. Aedeagal apex of three subequal lobes (Fig. 136) .... *paleta* Stark
– Aedeagal apex not trilobed (Fig. 33) .... 28.

28. Aedeagal apex appearing notched (Fig. 33), lateral aspect somewhat hatched shaped (Fig. 34) ... . *calima*
– Aedeagal apex blunt or rounded (Fig. 93), lateral aspect more scoop shaped (Fig. 94) .... 29.

29. Aedeagal body with swollen lateral knobs at hook bases (Fig. 93); wing length greater than 12 mm .... *planada*
– Aedeagal body without swollen lateral knobs (Fig. 43); wing length less than 11 mm .... 30.

30. Pronotum with narrow irregular pigment bands, head almost entirely yellow (Fig. 41) .... *cipriano*
– Pronotum with broad, pale pigment bands, head forward of ocelli diffuse yellow brown (Fig. 66) .... *meta*



Figs 1-5. *Anacroneuria albimacula* Klapálek. **1.** ♀ sterna 8 and 9. **2.** ♂ sternum 9. **3.** Aedeagus ventral. **4.** Aedeagus lateral. **5.** Aedeagus dorsal. Scales: 0.3 mm (**1, 2**), 0.15 mm (**3-5**).

***Anacroneuria albimacula* Klapálek**
(Figs 1-5)

Anacroneuria albimacula Klapálek, 1921: Holotype ♂ (lost), Bogota, Colombia.

Types. Neotype: ♂ (pinned), Colombia, Antioquia, 12 km E Medellin, 6 February 1983, O. S. Flint (USNM).
Additional specimens. 1♀ (pinned), same data as neotype (USNM).

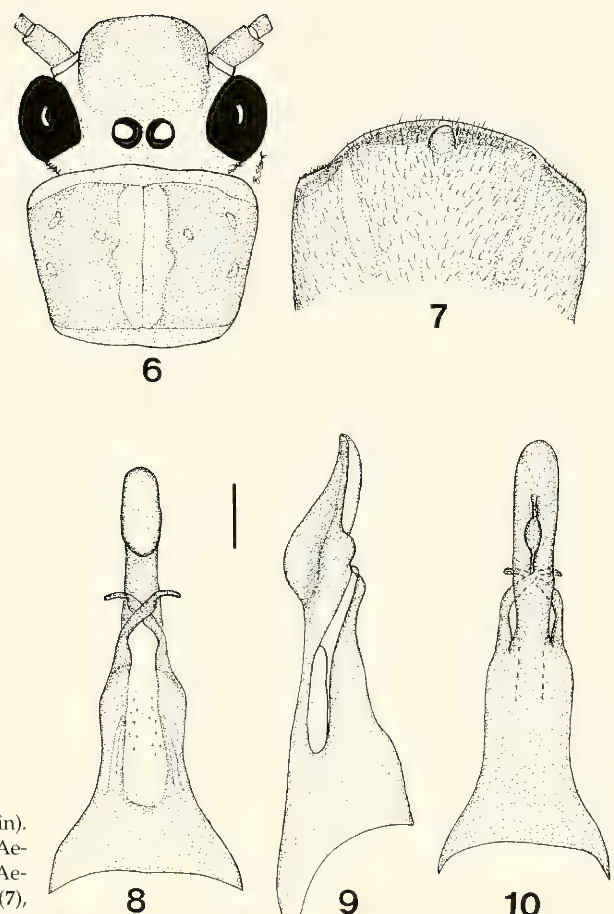
Description
Adult habitus. Brown pigment covers ocelli and extends to anterior margins of compound eyes. Lappets brown. Pronotum with dark midlateral pigment bands; wide mesal band pale. Wing membrane and veins dark, except for pale costal margins and subapical circular area at cord.

Male. Forewing length 12 mm. Hammer broad basally, narrowed to a flat, circular apex; height subequal to basal diameter (Fig. 2). Ventral and dorsal aspect of aedeagal apex trilobed; lateral lobes short and acute, apical lobe slender and finger shaped (Figs. 3-5). In lateral aspect, apical lobe oblique and lateral lobes broadly rounded (Fig. 4).

Female. Forewing length 14.5 mm. Subgenital plate with four lobes (Fig. 1). Lateral lobes separated from median lobes by shallow notch; median lobes separated by deeper V-shaped notch. Transverse sclerite of sternum nine weakly sclerotized, hardly discernable in setal patch. Setal patch trilobed; mesal lobe extends into median notch of subgenital plate; setae of mesal lobe minute, lateral setae long and coarse.

Nymph. Unknown.

Discussion. *Anacroneuria albimacula* is the genotype of *Anacroneuria* by subsequent designation of Claassen (1940). Because the holotype is lost (L. Benedetto, pers. comm.), and no figures were given by Klapálek (1921), we are designating a neotype in order to insure generic stability. The holotype was from "Bogota" in the Cordillera Oriental and the neotype from near Medellin in the Cordillera Central,



Figs 6-10. *Anacroneuria angusticollis* (Enderlein). **6.** Head and pronotum. **7.** ♂ sternum 9. **8.** Aedeagus ventral. **9.** Aedeagus lateral. **10.** Aedeagus dorsal. Scales: 0.6 mm (**6**), 0.3 mm (**7**), 0.15 mm (**8-10**).

but the specimen agrees in size and basic color pattern with Klapálek's description. Significantly, the holotype and the neotype share an apical pale pigment spot in the wings. This character occurs sporadically among *Anacroneuria* species but it is apparently uncommon among those from Colombia. *Anacroneuria schmidti*, which shares this wing pattern and the subgenital plate outline, is a much smaller species (Zwick 1973).

Anacroneuria angusticollis (Enderlein)
Figs 6-10

Neoperla angusticollis Enderlein, 1909b: Holotype ♂, Rio Magdalena, Colombia.
Anacroneuria unicolor Klapálek, 1922: Holotype ♂, Colombia. Syn. Zwick, 1973.
Anacroneuria angusticollis, Zwick 1973

Redescription
Adult habitus. Head yellow to diffuse yellow-brown, lappets brown. Pronotum dark brown with narrow mesal pale stripe. Anterior face of femora and tibiae dark brown. Wing membrane transparent, veins dark brown.

Male. Forewing length 13 mm. Hammer thimble shaped, height about equal to basal diameter (Fig. 7). Aedeagal apex long, slender and ventrally excavated (Figs. 8, 10). Dorsal keel well developed

(Figs. 9, 10). Hooks slender and apically digitate (Fig. 8).

Female. Unknown.

Nymph. Unknown.

Examined material: 1♂, ECUADOR: Napo, Tena, 23 May 1977, P. Spangler and D. Givens, 1♂ (USNM). Napo, Misahaulli, 1 January 1989, R. W. Sites (UMO).

Discussion. Zwick (1973) redescribed the holotype of this species from Rio Magdalena, Colombia, and placed *A. handlirschi* Klapálek and *A. unicolor* Klapálek as synonyms. Subsequently, Stark & Sivec (1998) removed *A. handlirschi* from synonymy. We have not found this species among our Colombian material but it is fairly common among Ecuadoran specimens we have seen. The figures were made from specimens collected in Napo Province, Ecuador.

Anacroneuria apicalis (Enderlein)

Neoperla apicalis Enderlein, 1909a: Holotype ♀, Rio Magdalena, Colombia.
Anacroneuria apicalis, Zwick 1973

Diagnosis

Adult habitus (modified from Zwick 1973). Head ocre, lappets and ocellar areas black. Lateral pronotal bands dark brown, median pale band wide. Legs banded; femoral apex and tibial base and apex black. Wings transparent, veins brown except pale costal area.

Male. Unknown.

Female (modified from Zwick 1973). Forewing length 12.5 mm. Subgenital plate with four lobes separated by shallow notches. Sternum 9 setal patch trilobed; median lobe with minute setae, lateral lobes with variable larger and coarser setae.

Nymph. Unknown.

Examined material: None.

Discussion. Presently we are unable to associate this name with any of the species represented in our material.

Anacroneuria bifasciata (Pictet)

Perla bifasciata Pictet, 1841: Holotype ♀, Colombia.
Anacroneuria bifasciata, Zwick 1972
Anacroneuria bifasciata, Stark 1995

We have no additional Colombian records of this species. Zwick (1973) reported two Colombian female specimens collected by Pehlke in 1914 but no specific locality was given.

Anacroneuria bolivari (Banks)
Figs 11-14

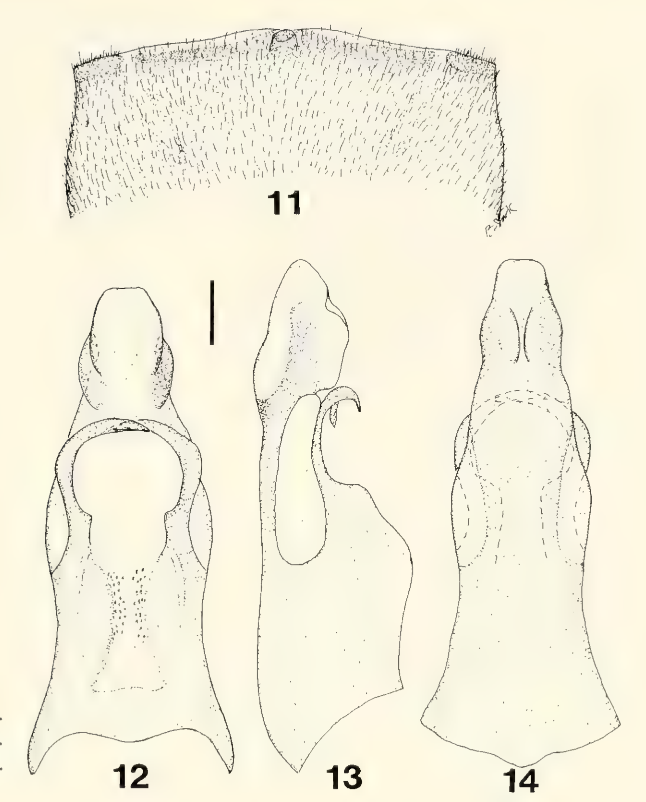
Neoperla bolivari Banks, 1914: Holotype ♀, Monte Socorro, Colombia.

Diagnosis

Adult habitus. Head yellow with darker lappets. Pale median pronotal stripe wide, narrow submarginal stripes brown. Wing membrane transparent, most veins pale brown; R vein dark brown, costal area pale.

Male (putative). Forewing length 18 mm. Hammer subcylindrical, height less than basal diameter (Fig. 11). Aedeagal apex broadly rounded with swollen subapical lateral lobes; dorsal keel low, hooks slender (Figs 12-14).

Female. Forewing length 23-25 mm. Subgenital plate bilobed; lobes broadly rounded, notch narrow. Transverse sclerite of sternum 9 narrow, sparsely hirsute near ends; setal patch triangular, median



Figs 11-14. *Anacroneuria bolivari* (Banks). **11.** ♂ sternum 9. **12.** Aedeagus ventral. **13.** Aedeagus lateral. **14.** Aedeagus dorsal. Scales: 0.3 mm (**11**), 0.15 mm (**12-14**).

setae minute, lateral setae long and coarse.

Nymph. Unknown.

Examined material: Holotype, ♀ (abdomen missing), Colombia, Monte Socorro, 3600 m, Fassl (MCZ); 1♀ (pinned), Colombia: Antioquia, Quebrada Espadera, 7 km E Medellin, 24 February 1983, O. S. Flint (USNM); 3♂♂ (pinned), Risaralda, Termales de Santa Rosa de Cabal, 29 February 1984, C. M. and O. S. Flint (USNM).

Discussion. The condition of the holotype does not permit a definitive association, but based on similarities in size, color pattern and subgenital plate shape, this assignment seems reasonable. The males are tentatively associated on the basis of coloration and size.

Anacroneuria farallonensis Rojas & Baena

Anacroneuria farallonensis Rojas & Baena, 1993: Holotype ♂, Peñas Blancas, 2000 m, Rio Cali, Valle del Cauca, Colombia.

We have no additional records of this species.

Anacroneuria fenestrata (Pictet)

Perla fenestrata Pictet, 1841: Holotype ♂, Colombia.
Anacroneuria fenestrata, Zwick 1972
Anacroneuria fenestrata, Stark 1995

We have no additional records of this species.

Anacroneuria pallens Klapálek
Figs 15-19

Anacroneuria pallens Klapálek, 1922: Lectotype ♂, here designated, Bogota, Colombia.

Diagnosis
Adult habitus (modified from Klapálek 1922). Body ochre yellow, anterior portion of head and sides of the pronotum distinctively darker, somewhat darker reddish. Legs ochre yellow except dorsal and distal edges of femora, and basal and distal areas of tibia, darker brown; apical tarsal segment darker, brownish. Wing membrane pale, glossy, veins yellow brown.

Male. Forewing length 18-19 mm. Hammer a small, circular, slightly raised disc (Fig. 15). Ventral aedeagal apex broadly rounded, terminating in an oval, longitudinally cleft platform. Hooks large, scythe shaped (Fig. 17). Dorsal and lateral aspect of aedeagal apex strongly keeled; keel forming a long, sinuate X-pattern (Figs 18-19).

Female (putative). Forewing length 22-25 mm. Subgenital plate bilobed; lobes obliquely truncate; notch shallow, U-shaped (Fig. 16).

Nymph. Unknown.

Examined material: ♂ Lectotype (pinned), Bogota, Colombia, 31 October 1888, Lindig (NMP); 1♀ (paralectotype), Bogota, Colombia, 2 November 1888, Lindig (NMP).

Discussion. The type series of *A. pallens* may have included additional specimens but of the two syntypes known to have survived, we select the male as lectotype. The abdomen is in a microvial labelled "#84", on the specimen pin. The damaged syntype female subgenital plate and terminal segments are in a microvial labelled "#85", on the specimen pin. Both specimens are in the National Museum of Natural History, Prague.

Anacroneuria pehlkei (Enderlein)

Neoperla pehlkei Enderlein, 1909a: Holotype ♀, Natagaima, Colombia.
Anacroneuria pehlkei, Zwick 1973

Diagnosis
Adult habitus (modified from Zwick 1973). Body yellow but outer margins of head dark. Pronotum yellow with wide submarginal bands and very narrow pale margins. Legs black except for sharply pale banded femoral base.

Male. Unknown.

Female (modified from Zwick 1973). Forewing length 11 mm. Subgenital plate four lobed; lobes subequal but median notch deeper than lateral notches. Setal patch of sternum 9 trilobed; mesal patch with minute setae, lateral patches with larger, coarser setae.

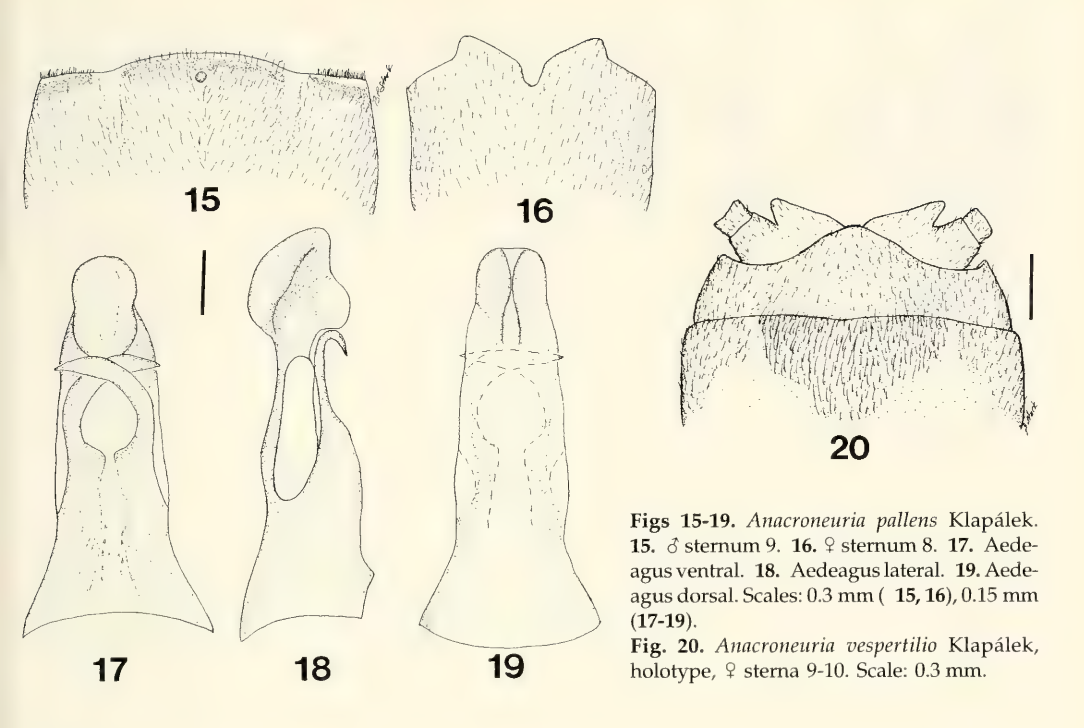
Nymph. Unknown.

Examined material: None.

Discussion. The type locality, in a valley between the Cordillera Central and Cordillera Oriental in the Departmento del Tolima, is in the general region where a few of our specimens were collected. We cannot presently associate this name with any of the species we have seen.

Anacroneuria schmidti (Enderlein)

Neoperla schmidti Enderlein, 1909a: Holotype ♀, Balzapamba, Ecuador.
Anacroneuria variegata Klapálek, 1921: Lectotype ♀, Bogota, Colombia, syn. Zwick, 1973.
Anacroneuria schmidti, Zwick 1973



Figs 15-19. *Anacroneuria pallens* Klapálek. **15.** ♂ sternum 9. **16.** ♀ sternum 8. **17.** Aedeagus ventral. **18.** Aedeagus lateral. **19.** Aedeagus dorsal. Scales: 0.3 mm (**15, 16**), 0.15 mm (**17-19**).
Fig. 20. *Anacroneuria vespertilio* Klapálek, holotype, ♀ sterna 9-10. Scale: 0.3 mm.

Diagnosis

Adult habitus (modified from Zwick 1973). Head yellow, pronotum yellow except for narrow brown submarginal stripes. Wing membrane pale, veins brown except for pale costal area (C, Sc, R) and an apical clear window spot.

Male. Unknown.

Female (modified from Zwick 1973). Forewing length 9.5-10.5. Subgenital plate four lobed; lobes rounded and separated by shallow notches; median notch V-shaped and deeper than lateral notches. Sternum 9 setal patch trilobed; median lobe with minute setae, lateral lobes with variable larger and coarser setae.

Nymph. Unknown.

Examined material: None.

Discussion. We are presently unable to associate this name with any of the species in our material. The species is similar in color pattern and subgenital plate shape and setation to *A. albimacula*, but is significantly smaller.

Anacroneuria vespertilio Klapálek

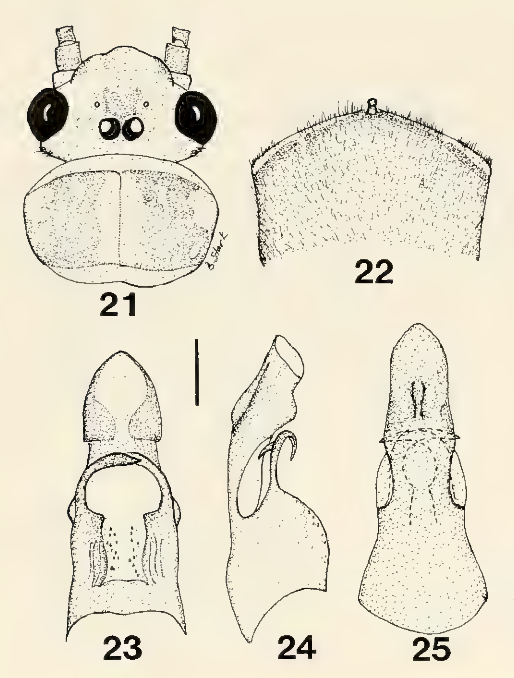
Fig. 20

Anacroneuria vespertilio Klapálek, 1921: Holotype ♀, Bogota,Colombia.

Diagnosis

Adult habitus (modified from Klapálek 1921). Dorsum of body Van Dyke brown, darker on the pro- and mesonotum. M-line and calluses of the frons paler, transceeding to ochre yellow. Antennae and palpi sepia brown, legs slightly paler, but a narrow black band at the femoral apex. Wings brown with dark brown veins.

Male. Unknown.



Figs 21-25. *Anacroneuria anchicaya*, spec. nov. **21.** Head and pronotum. **22.** ♂ sternum 9. **23.** Aedeagus ventral. **24.** Aedeagus lateral. **25.** Aedeagus dorsal. Scales: 0.6 mm (**21**), 0.3 mm (**22**), 0.15 mm (**23-25**).

Female. Forewing length about 30 mm. Subgenital plate destroyed. Setal patch of sternum 9 broadly triangular, clothed throughout with red brown setae (Fig. 20).

Nymph. Unknown.

Examined material: ♀ Holotype, Colombia, Bogota, Lindig (MNHB).
Discussion. One of us (BPS) studied fragments of the holotype while it was on loan to P. Zwick. The subgenital plate had been destroyed, or lost, and only part of segments nine and ten were intact for our study. These segments are in a microvial and presumably are now with any other fragments of the specimen in the Museum für Naturkunde der Humboldt Universität, Berlin. The large size and prominent red-brown setal patch on the female sternum 9 may permit this name to be associated with other specimens in the future.

Anacroneuria anchicaya Baena & Zúñiga, spec. nov.
Figs 21-25

Types. Holotype: ♂, Colombia, Valle del Cauca, Alto Anchicayá, 700 m, 12 May 1994, A. M. Rojas, A. Ramos (MEUV). – Paratype: ♂, Colombia, Valle del Cauca, Rio Desbaratado, 1100 m, 10 June 1992, A. M. Rojas, M. Baena (BPS).

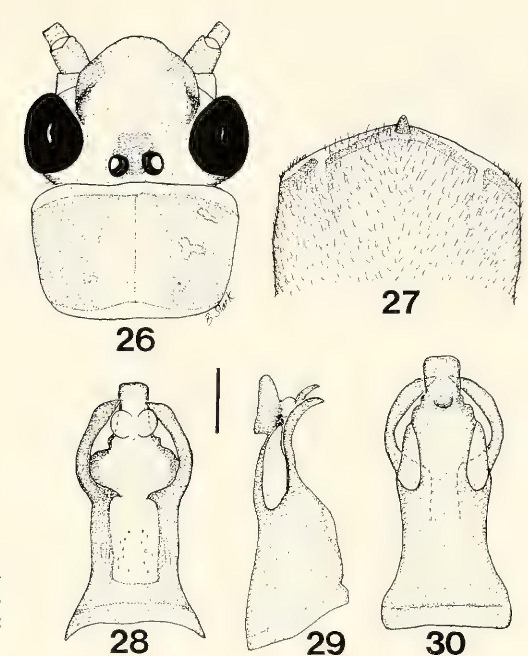
Description
Adult habitus. Head yellow with dark spot over ocellar region; lappets dark brown; blotch forward of M-line pale brown. Pronotum with dark brown midlateral stripes, pale on anterolateral margins; median stripe pale (Fig. 21). Wing membrane pale brown, veins brown.

Male. Forewing length 9 mm. Hammer subcylindrical, height slightly greater than basal diameter (Fig. 22). Aedeagal apex simple; ventral aspect broadly triangular, wider than neck area beyond hooks (Fig. 23). Dorsal aspect with a broad low keel (Fig. 25). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name refers to the locality from which the holotype was collected and is used as a noun in apposition.



Figs 26-30. *Anacroneuria azul*, spec. nov. **26.** Head and pronotum. **27.** ♂ sternum 9. **28.** Aedeagus ventral. **29.** Aedeagus lateral. **30.** Aedeagus dorsal. Scales: 0.6 mm (**26**), 0.3 mm (**27**), 0.15 mm (**28-30**).

Anacroneuria azul Rojas & Baena, spec. nov.
Figs 26-30

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, Cuenca media Rio Calima, 550 m, 10 August 1994, A. M. Rojas, M. Baena (MEUV). – Paratypes: all from Colombia: 1♂, Cauca, Vereda Alegria, 1100 m, Trampa de luz 10 April 1993, A. Ramos (MEUV); 1♂, Cauca, Santander de Quilichao, Hosp. Pared., 1000 m, 13 March 1993, F. Riascos (MEUV); 2♂♂, Valle del Cauca, type locality, 21 February 1994, A. M. Rojas, M. Baena, A. Ramos (USNM); 1♂, same location, 20 February 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV); 2♂, same location, 11 August 1994, A. M. Rojas, M. Baena, R. Aldana (BPS); 1♂, same location, 15 February 1992, A. M. Rojas, R. Aldana (MEUV).

Description

Adult habitus. Head yellow brown with dark ocellar area and lappets. Mid pronotal area yellow, bordered by broad dark brown bands (Fig. 26). Wing membrane transparent, veins brown. Femora yellow with dark brown band in distal half; tibiae with basal and apical dark bands.

Male. Forewing length 11 mm. Hammer somewhat conical (Fig. 27). Aedeagal apex truncate with a pair of membranous ventral lobes and a small transverse, arcuate keel (Figs 28, 30). Lateral margins parallel, lateral aspect somewhat foot shaped (Fig. 29). Scythe shaped hooks almost reach aedeagal tip (Fig. 28).

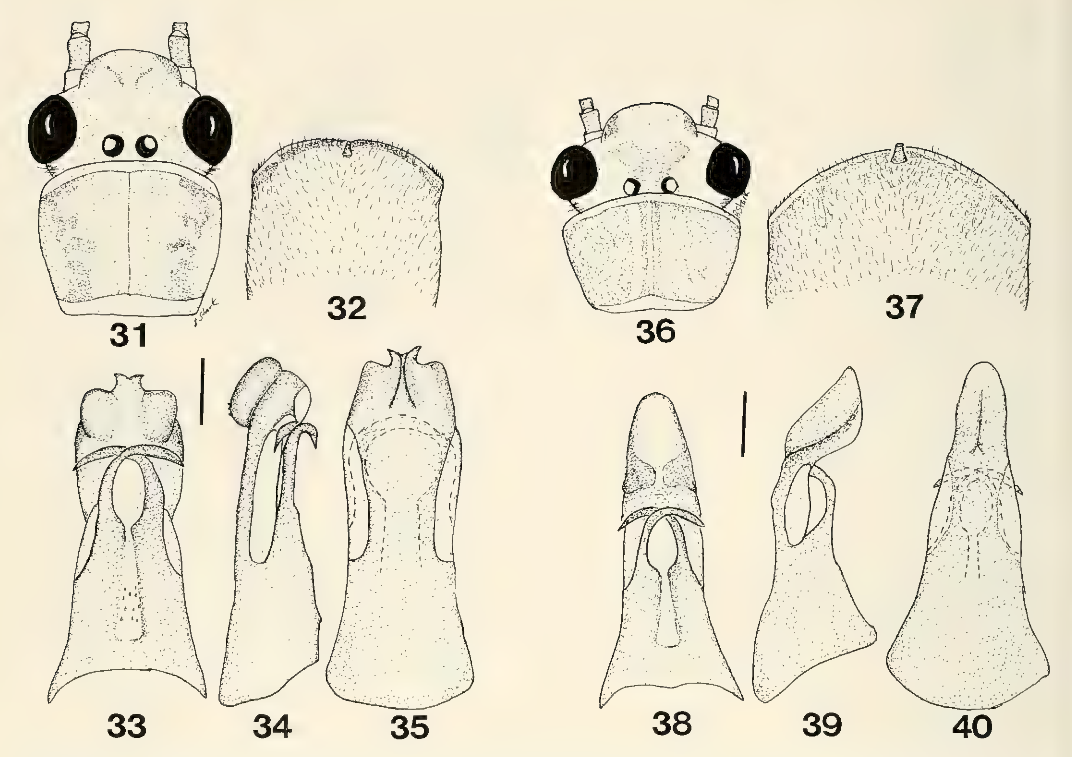
Female. Unknown.

Nymph. Unknown.

Etymology. The species name refers to the river basin from which the holotype was collected and is used as a noun in apposition.

Anacroneuria calima Baena & Rojas, spec. nov.
Figs 31-35

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, 550 m, Cuenca media Rio Calima, 11 August 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV). – Paratypes: 3♂♂,same data; 1♂, Valle del Cauca, type locality, 21 February 1994, A. M. Rojas, M. Baena, R. Aldana (BPS); 1♂, same location, 6 July 1994, A. M. Rojas, A. Ramos (USNM).



Figs 31-35. *Anacroneuria calima*, spec. nov. **31.** Head and pronotum. **32.** ♂ sternum 9. **33.** Aedeagus ventral. **34.** Aedeagus lateral. **35.** Aedeagus dorsal. Scales: 0.6 mm (**31**), 0.3 mm (**32**), 0.15 mm (**33-35**).
Figs 36-40. *Anacroneuria choachi*, spec. nov. **36.** Head and pronotum. **37.** ♂ sternum 9. **38.** Aedeagus ventral. **39.** Aedeagus lateral. **40.** Aedeagus dorsal. Scales: 0.6 mm (**36**), 0.3 mm (**37**), 0.15 mm (**38-40**).

Description

Adult habitus. Head brown with dark lappets and a pair of small divergent bars near the anterior margin; ocellar region pale. Pronotum with irregular midlateral dark bands (Fig. 31). Wing membrane and veins brown. Femora dark brown along dorsal surface and at distal end, tibiae dark brown.

Male. Forewing length 10.5 mm. Hammer somewhat conical (Fig. 32). Aedeagal apex notched with a rounded pair of subapical lobes (Fig. 33). Dorsal aspect with a long median keel (Fig. 35); dorsolateral aspect hatchet shaped (Fig. 34). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name refers to the Rio Calima basin in which the holotype was collected and is used as a noun in apposition.

Anacroneuria choachi Stark & Zúñiga, spec. nov.

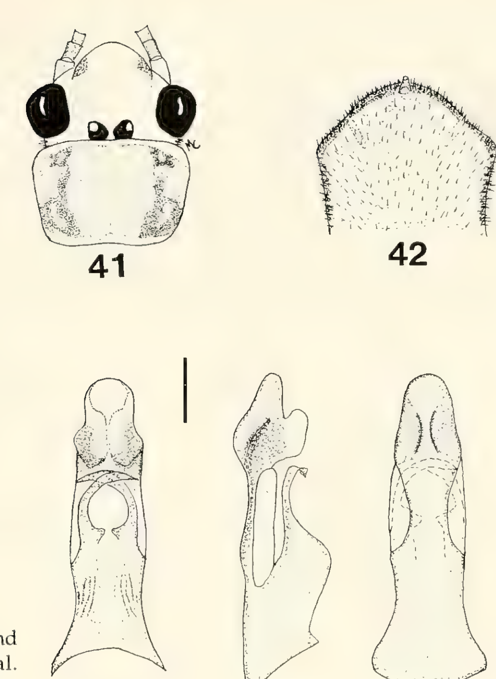
Figs 36-40

Types. Holotype: ♂ (pinned), Colombia, Cundinamarca, Choachi, 17 May 1944, F. R. Fosberg (USNM).

Description

Adult habitus. Head forward of ocelli and along anterior margin pale brown, lappets brown. Median pronotal stripe diffuse brown, bordered by narrow pale stripes and broad dark lateral stripes (Fig. 36). Wing membrane transparent, veins brown.

Male. Forewing length 11 mm. Hammer thimble shaped, height subequal to basal diameter



Figs 41-45. *Anacroneuria cipriano*, spec. nov. **41.** Head and pronotum. **42.** ♂ sternum 9. **43.** Aedeagus ventral. **44.** Aedeagus lateral. **45.** Aedeagus dorsal. Scales: 0.6 mm (**41**), 0.3 mm (**42**), 0.15 mm (**43-45**).

(Fig. 37). Aedeagal apex simple, scoop shaped and gradually narrowed beyond hooks. Dorsomesal keel sharp, Y-shaped, hooks slender (Figs 38-40).

Female. Unknown.

Nymph. Unknown.

Etymology. The species name is based on the location where the holotype was collected and is used as a noun in apposition.

Anacroneuria cipriano Zúñiga & Rojas, spec. nov.

Figs 41-45

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, Cuenca media Rio Calima, 550 m, 21 February 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV). – Paratype: 1♂, Colombia, Valle del Cauca, Escalerate, Cuenca Rio San Cipriano, 150 m, 15 February 1992, A. M. Rojas, M. del C. Zúñiga (BPS).

Description

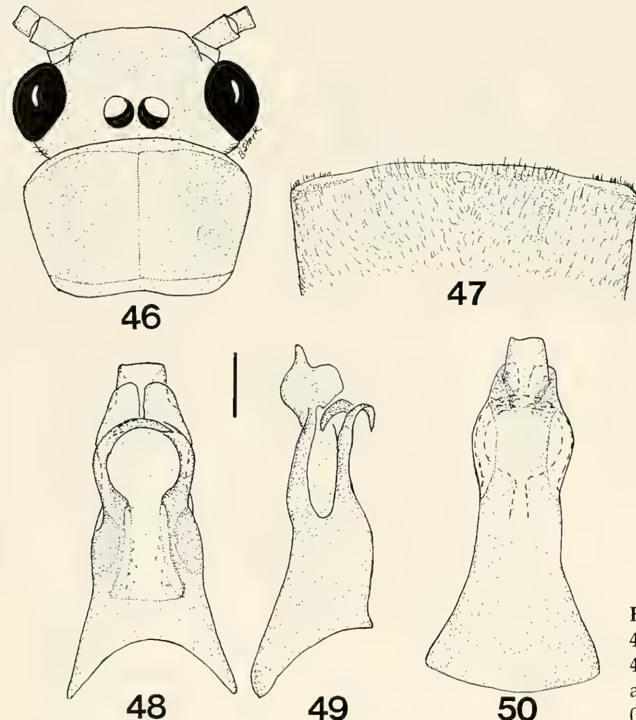
Adult habitus. Head yellow brown with dark lappets. Pronotum with irregular midlateral dark pigment and broad mesal pale stripe (Fig. 41). Wing membrane transparent, veins brown except pale costal area.

Male. Forewing length 8 mm. Hammer cylindrical, height twice as great as basal diameter (Fig. 42). Ventral aedeagal apex scoop shaped with subapical shoulders slightly sclerotized (Fig. 43). Dorsal aspect with a low mesal keel (Fig. 45). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name is based on the river basin in which the paratype was found and is used as a noun in apposition.



Figs 46-50. *Anacroneuria cordillera*, spec. nov. **46.** Head and pronotum. **47.** ♂ sternum 9. **48.** Aedeagus ventral. **49.** Aedeagus lateral. **50.** Aedeagus dorsal. Scales: 0.6 mm (**46**), 0.3 mm (**47**), 0.15 mm (**48-50**).

Anacroneuria cordillera Rojas & Zúñiga, spec. nov.

Figs 46-50

Types. Holotype: ♂, Colombia, Valle del Cauca, Villa Carmelo, Cuenca alta, Rio Meléndez, 1800 m, Trampa de luz, 15 October 1991, A. M. Rojas, M. del C. Zúñiga, C. Serrato (MEUV).

Description

Adult habitus. Head pale with diffuse brown over area forward of ocelli and extending to M-line; lappets pale. Median pronotal stripe pale, irregular midlateral stripes brown (Fig. 46). Wing membrane transparent, veins pale.

Male. Forewing length 14 mm. Hammer reduced to a small depigmented zone (Fig. 47). Aedeagal apex simple, scoop shaped. Ventral membranous lobes well developed, dorsomesal keel absent, hooks slender (Figs 48-50).

Female. Unknown.

Nymph. Unknown.

Etymology. The species name is based on the Cordillera Occidental and is used as a noun in apposition.

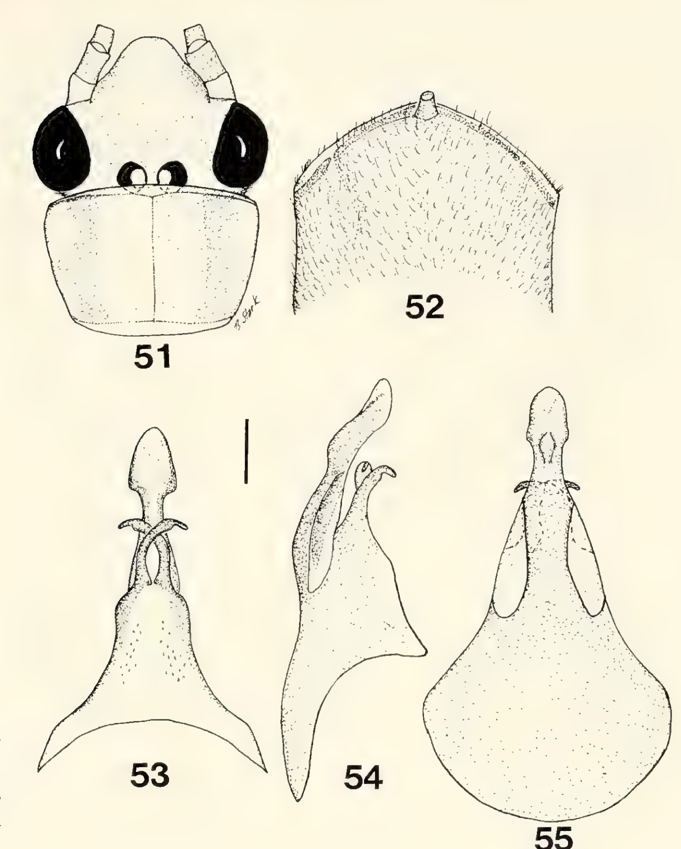
Anacroneuria forcipata Rojas & Baena, spec. nov.

Figs 51-55

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, 550 m, Cuenca media Rio Calima, 21 February 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV).

Description

Adult habitus. Head yellow brown except for darker lappets. Pronotum banded midlaterally with dark pigment (Fig. 51). Wing membrane transparent, veins brown.



Figs 51-55. *Anacroneuria forcipata*, spec. nov. **51.** Head and pronotum. **52.** ♂ sternum 9. **53.** Aedeagus ventral. **54.** Aedeagus lateral. **55.** Aedeagus dorsal. Scales: 0.6 mm (**5 1**), 0.3 mm (**52**), 0.15 mm (**53-55**).

Male. Forewing length 12 mm. Hammer thimble shaped, apex flat (Fig. 52). Aedeagus scoop shaped, broad basally and slender in the apical half; apex slightly enlarged (Fig. 53). Hooks short with wide finger shaped apices (Fig. 53). Ventrolateral aspect sinuate (Fig. 54); dorsal aspect with a low mesal keel (Fig. 55).

Female. Unknown.

Nymph. Unknown.

Etymology. The species name refers to the forceps shaped aedeagal hooks.

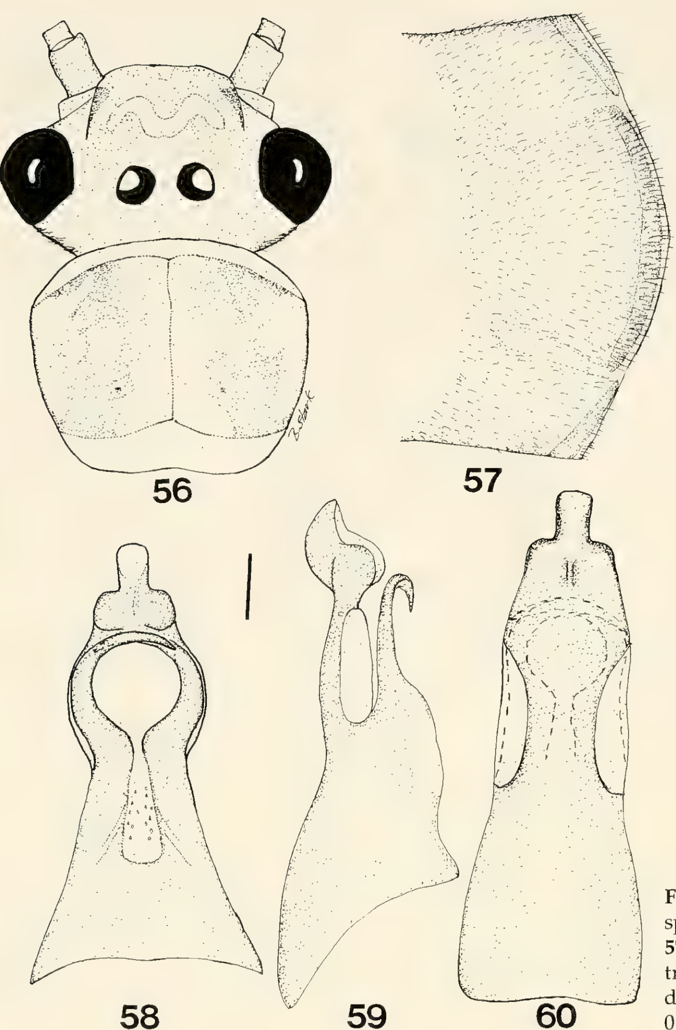
Anacroneuria guambiana Zúñiga & Stark, spec. nov.

Figs 56-60

Types. Holotype: ♂, Colombia, Cauca, Piendamó, Cuenca media Rio Piendamó, 1400 m, 23 November 1993, Y. Ballesteros, J. Loaiza (MEUV). – Paratypes (all from Colombia): 1♂, Cauca, Mondomo, 1100 m, 10 April, A. Ramos (USNM); 1♂, Cauca, Silvia, Cuenca alta Rio Piendamó, 2680 m, Trampa de luz, 15 September 1993, Y. Ballesteros, J. Loaiza (MEUV); 1♂, Cauca, Piendamó, Cuenca media Rio Piendamó, 1400 m, Trampa de luz, 25 October 1993, Y. Ballesteros, J. Loaiza (BPS); 1♂, Cauca, La Campana, Cuenca alta Rio Piendamó, 2900 m, Trampa de luz, 9 November 1993, Y. Ballesteros, J. Loaiza (MEUV); 1♂, Cauca, El Núcleo, Cuenca alta Rio Piendamó, 2700 m, Trampa de luz, 24 October 1993, Y. Ballesteros, J. Loaiza (MEUV).

Description

Adult habitus. Head pattern pale brown around M-line, lappets brown. Midlateral pronotal bands pale brown, mesal and anteolateral areas pale (Fig. 56). Wing membrane transparent, veins brown.



Figs 56-60. *Anacroneuria guambiana*, spec. nov. **56.** Head and pronotum. **57.** ♂ sternum 9. **58.** Aedeagus ventral. **59.** Aedeagus lateral. **60.** Aedeagus dorsal. Scales: 0.6 mm (**56**), 0.3 mm (**57**), 0.15 mm (**58-60**).

Male. Forewing length 22 mm. Hammer absent (Fig. 57). Aedeagal apex simple, truncate in ventral aspect with low rounded shoulders (Fig. 58). Dorsal keel obscure, hooks slender (Figs 58-60).
Female. Unknown.

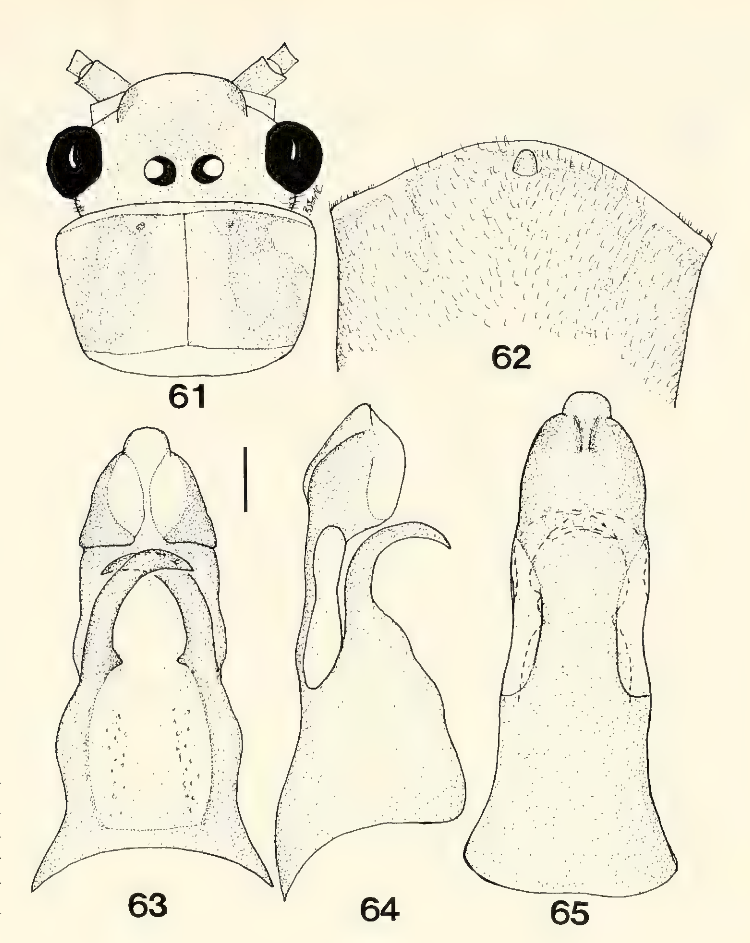
Nymph. Unknown.

Etymology. The name, used as a noun in apposition, refers to the distribution of this species in the region inhabited by the Guambiana people.

Anacroneuria guayaquil Zúñiga & Rojas, spec. nov.

Figs 61-65

Types. Holotype: ♂, Colombia, Quindio, Reserva Guayaquil, Cuenca alta, Rio Quindio, 3070 m, 29 April 1992, M. del C. Zúñiga, A. M. Rojas (MEUV).



Figs 61-65. *Anacroneuria guayaquil*, spec. nov. **61.** Head and pronotum. **62.** ♂ sternum 9. **63.** Aedeagus ventral. **64.** Aedeagus lateral. **65.** Aedeagus dorsal. Scales: 0.6 mm (**6 1**), 0.3 mm (**62**), 0.15 mm (**63-65**).

Description

Adult habitus. Head yellow brown with diffuse brown spot anterior to ocelli; lappets brown. Pronotum with brown lateral stripes and scattered pale rugosities; median stripe pale (Fig. 61). Wing membrane transparent, veins brown.

Male. Forewing length 19 mm. Hammer nipple shaped, height subequal to basal diameter (Fig. 62). Ventral aedeagal apex broadly triangular, sclerotized laterally and membranous mesally. Dorsomesal keel short, with widely spaced ridges (Figs 63-65).

Female. Unknown.

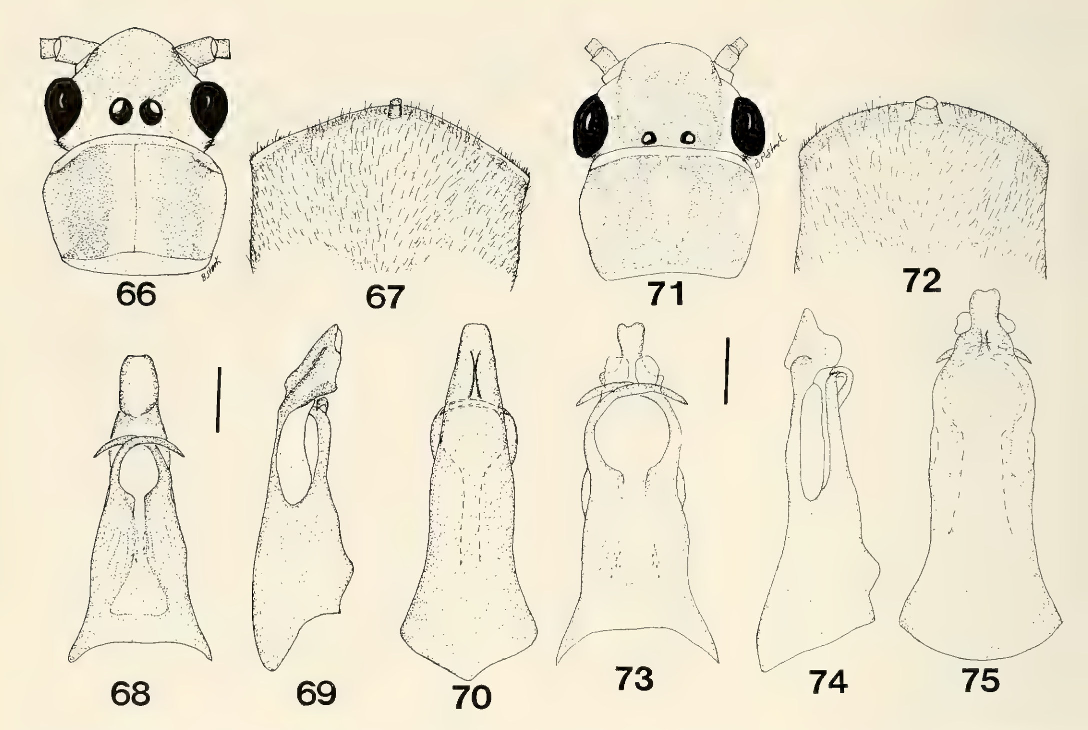
Nymph. Unknown.

Etymology. The species name, based on the type locality in the Reserva Guayaquil, is used as a noun in apposition.

Anacroneuria meta Stark & Zúñiga, spec. nov.

Figs 66-70, 140

Types. Holotype: ♂, Colombia, Meta, Quebrada Blanca, 3 km W Restrepo, 11 February 1983, O. S. Flint (USNM). – Paratype: 1♀, same data (USBN).



Figs 66-70. *Anacroneuria meta*, spec. nov. **66.** Head and pronotum. **67.** ♂ sternum 9. **68.** Aedeagus ventral. **69.** Aedeagus lateral. **70.** Aedeagus dorsal. Scales: 0.6 mm (**66**), 0.3 mm (**67**), 0.15 mm (**68-70**).
Figs 71-75. *Anacroneuria morena*, spec. nov. **71.** Head and pronotum. **72.** ♂ sternum 9. **73.** Aedeagus ventral. **74.** Aedeagus lateral. **75.** Aedeagus dorsal. Scales: 0.6 mm (**7 1**), 0.3 mm (**72**), 0.15 mm (**73-75**).

Description

Adult habitus. Head covered with diffuse brown pigment forward of ocelli; M-line indistinct; lappets brown. Midlateral pronotal stripes brown, margins and mesal stripe pale (Fig. 66).

Male. Forewing length 10 mm. Hammer subcylindrical, height greater than basal diameter (Fig. 67). Aedeagal apex simple; ventral aspect an oval platform, dorsal keel well developed, hooks slender (Figs 68-70).

Female. Forewing length 14 mm. Subgenital plate bilobed; lobes broadly rounded, notch shallow and wide. Transverse sclerite of sternum 9 narrow, setal patch triangular and without enlarged setae (Fig. 140).

Egg. Collar button like. Chorion smooth. Length 0.31 mm, diameter 0.18 mm. Outline typical for the genus.

Nymph. Unknown.

Etymology. The species name, based on the Colombian Department where it was collected, is used as a noun in apposition.

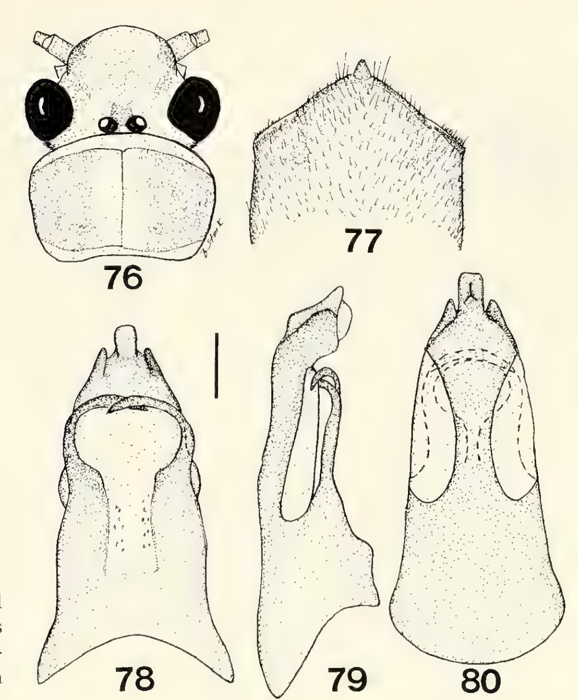
Anacroneuria morena Stark & Zúñiga, spec. nov.

Figs 71-75

Types. Holotype: ♂ (pinned), Colombia, Cundinamarca, Zipaquira-Pacho, 6 March 1965, J. A. Ramos (USNM).

Description

Adult habitus. Dark brown pigment covers much of head and pronotum. A pair of pale oval spots occur lateral to ocelli and three occur medially on frons. Anterior margin of head pale. Median, pale



Figs 76-80. *Anacroneuria oreja*, spec. nov. **76.** Head and pronotum. **77.** ♂ sternum 9. **78.** Aedeagus ventral. **79.** Aedeagus lateral. **80.** Aedeagus dorsal. Scales: 0.6 mm (**76**), 0.3 mm (**77**), 0.15 mm (**78-80**).

pronotal stripe narrow (Fig. 71). Wing membrane and veins dark brown, costa pale.

Male. Forewing length 11 mm. Hammer subcylindrical, height about equal to basal diameter (Fig. 72). Aedeagal apex narrow and emarginate; subapical area with a pair of ventral membranous masses arising from sclerotized lateral knobs (Fig. 73). Hooks slender. Dorsum with a low, median, subapical keel (Fig. 75).

Female. Unknown.

Nymph. Unknown.

Etymology. The name refers to the dark habitus of this species.

Anacroneuria oreja Zúñiga & Stark, spec. nov.

Figs 76-80

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, Cuenca media Rio Calima, 550 m, 21 February 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV).

Description

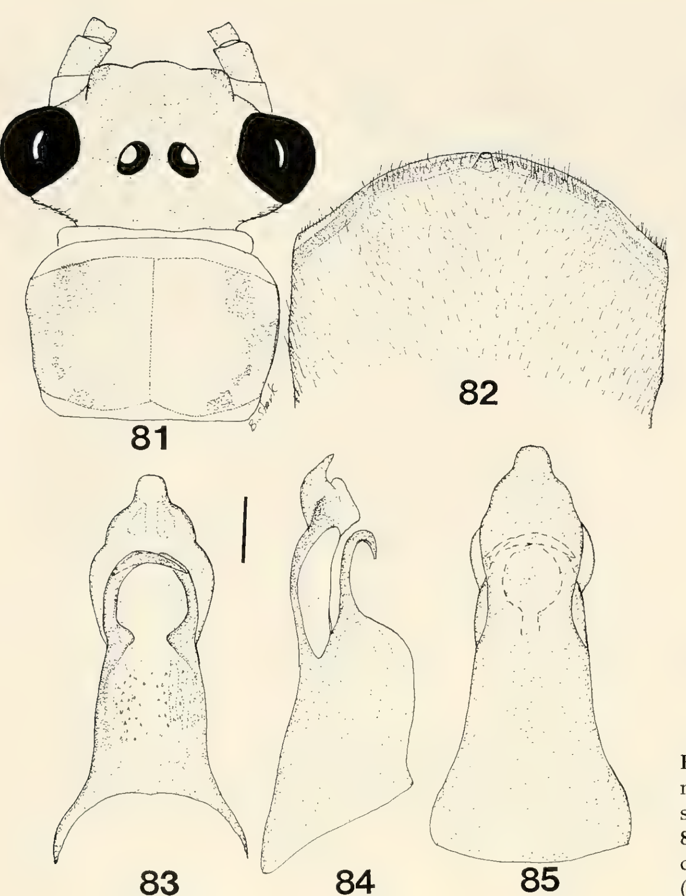
Adult habitus. Head yellow brown. Lappets and ocellar area dark brown. Pronotum with irregular dark stripes (Fig. 76). Wing membrane transparent, veins brown.

Male. Forewing length 10 mm. Hammer somewhat conical (Fig. 77). Ventral aspect of aedeagus trilobed; lateral lobes somewhat ear shaped, median lobe truncate (Figs 78-79). Dorsal aspect with a small Y-shaped keel (Fig. 80). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. Oreja, Spanish for ear, refers to the ear shaped lateral lobes on the aedeagal tip.



Figs 81-85. *Anacroneuria pacifica*, spec. nov. **81.** Head and pronotum. **82.** ♂ sternum 9. **83.** Aedeagus ventral. **84.** Aedeagus lateral. **85.** Aedeagus dorsal. Scales: 0.6 mm (**81**), 0.3 mm (**82**), 0.15 mm (**83-85**).

Anacroneuria pacifica Rojas & Baena, spec. nov.
Figs 81-85

Types. Holotype: ♂, Colombia, Valle del Cauca, Alto Anchicayá, 700 m, 12 May 1994, A. M. Rojas, A. Ramos (MEUV). – Paratypes (all from Colombia): 1♂, same data as ho0lotype (MEUV); 1♂, Valle del Cauca, Rio Azul, Cuenca media Rio Calima, 550 m, 12 August 1994, A. M. Rojas, M. Baena, R. Aldana (USNM); 1♂, same location, 21 November 1994, R. Aldana (BPS).

Description

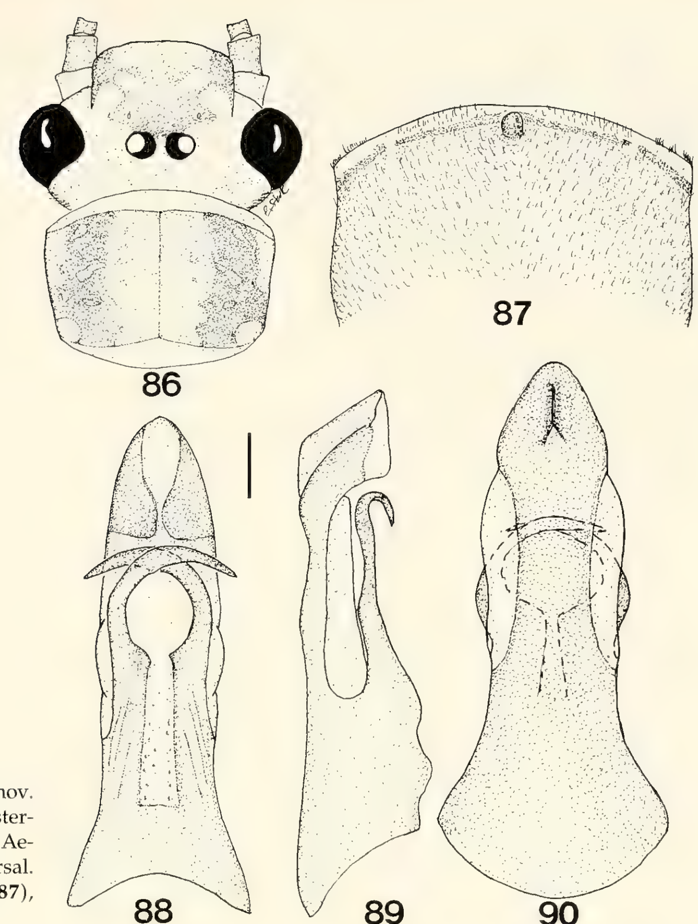
Adult habitus. Head yellow with pale M-line forward of ocelli; lappets brown. Pronotum with irregular brown bands laterally, median stripe pale (Fig. 81). Wing membrane transparent, veins pale except dark brown M and Cu veins.

Male. Forewing length 17-18 mm. Hammer height subequal to apical diameter (Fig. 82). Aedeagal apex simple, with a pair of small midventral lobes (Fig. 83). Dorsal keel absent, hooks slender (Figs 83-85).

Female. Unknown.

Nymph. Unknown.

Etymology. The name, used as a noun in apposition, refers to the distribution of the species in the Costa Pacifica region of Colombia.



Figs 86-90. *Anacroneuria paez*, spec. nov. **86.** Head and pronotum. **87.** ♂ sternum 9. **88.** Aedeagus ventral. **89.** Aedeagus lateral. **90.** Aedeagus dorsal. Scales: 0.6 mm (**86**), 0.3 mm (**87**), 0.15 mm (**88-90**).

Anacroneuria paez Zúñiga & Stark, spec. nov.

Figs 86-90

Types. Holotype: ♂, Colombia, Cauca, Caldono, Cuenca media Rio Ovejas, 1430 m, Trampa de luz, 15 September 1993, Y. Ballesteros, J. Loaiza (MEUV). – Paratypes: 1♂, Colombia, Cauca, Pescador, Cuenca media Rio Ovejas, 1430 m, Trampa de luz, 15 September 1993, Y. Ballesteros, J. Loaiza (BPS).

Description

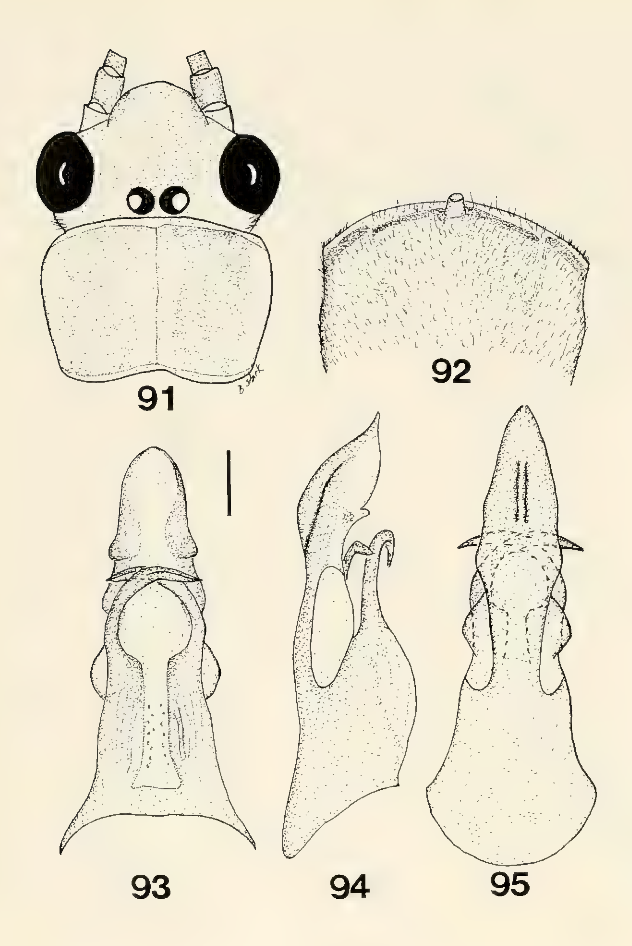
Adult habitus. Diffuse brown area extends from ocelli to M-line, lappets brown. Median pronotal band pale, irregular lateral bands brown, anterolateral margins pale (Fig. 86). Wing membrane transparent, veins brown.

Male. Forewing length 19 mm. Hammer nipple shaped, height subequal to basal diameter (Fig. 87). Aedeagal apex simple, scoop shaped, gradually narrowed to tip; ventral membranous lobes absent, dorsomesal keel prominent, hooks slender (Figs 88-90).

Female. Unknown.

Nymph. Unknown.

Etymology. Paez honors the indigenous peoples of Colombia and is used as a noun in apposition.



Figs 91-95. *Anacroneuria planada*, spec. nov. **91.** Head and pronotum. **92.** ♂ sternum 9. **93.** Aedeagus ventral. **94.** Aedeagus lateral. **95.** Aedeagus dorsal. Scales: 0.6 mm (**91**), 0.3 mm (**92**), 0.15 mm (**93-95**).

Anacroneuria planada Baena & Rojas, spec. nov.

Figs 91-95

Types. Holotype: ♂, Colombia, Nariño, Reserva Natural La Planada, 1400 m, April 1994, F. Escobar (MEUV). – Paratypes: 1♂, Colombia: Valle del Cauca, Alto Anchicayá, 700 m, 12 May 1994, A. M. Rojas, A. Ramos, (BPS); 1♂, type locality, April 1994, F. Escobar (USNM).

Description

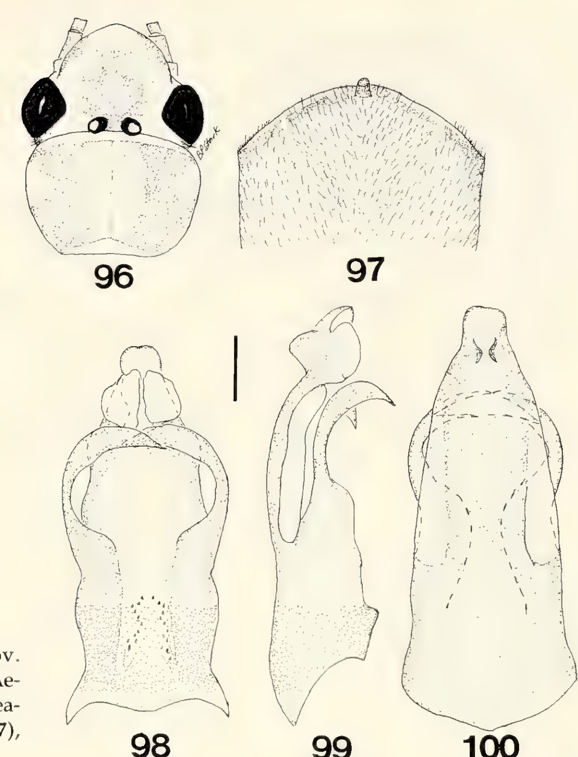
Adult habitus. Head yellow, lappets pale brown. Pronotum yellow with broad pale brown lateral stripes (Fig. 91). Wing membrane transparent, veins pale.

Male. Forewing length 13.5 mm. Hammer cylindrical, height subequal to basal diameter (Fig. 92). Apex broadly triangular (Fig. 93). Lateral aspect with a long low keel, dorsal aspect with a low mesal keel (Figs 94-95). Basal section bearing a pair of low membranous knobs lateral to hooks (Fig. 93). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. Planada refers to the type locality and is used as a noun in apposition.



Figs 96-100. *Anacroneuria portilla*, spec. nov. **96.** Head and pronotum. **97.** ♂ sternum 9. **98.** Aedeagus ventral. **99.** Aedeagus lateral. **100.** Aedeagus dorsal. Scales: 0.6 mm (**96**), 0.3 mm (**97**), 0.15 mm (**98-100**).

Anacroneuria portilla Stark & Rojas, spec. nov.
Figs 96-100

Types. Holotype: ♂, and Colombia, Cauca, 18 km N Popayan, 1800 m, 26 January 1959, J. F. Clarke (USNM). – Paratype: 1♂, same data (USNM).

Description

Adult habitus. Mesal part of head, forward of ocelli, covered by large brown patch, interrupted by five circular pale areas. Pronotal bands dark laterally, pale in mesal third (Fig. 96). Wing membrane brown, veins darker.

Male. Forewing length 11 mm. Hammer subcylindrical, height greater than basal diameter (Fig. 97). Aedeagal apex broadly rounded and scoop shaped; ventral subapical lobes large and membranous; dorsal keel formed by a pair of small ear shaped flaps separated by a narrow gap. Hooks enlarged in apical half (Figs 98-100).

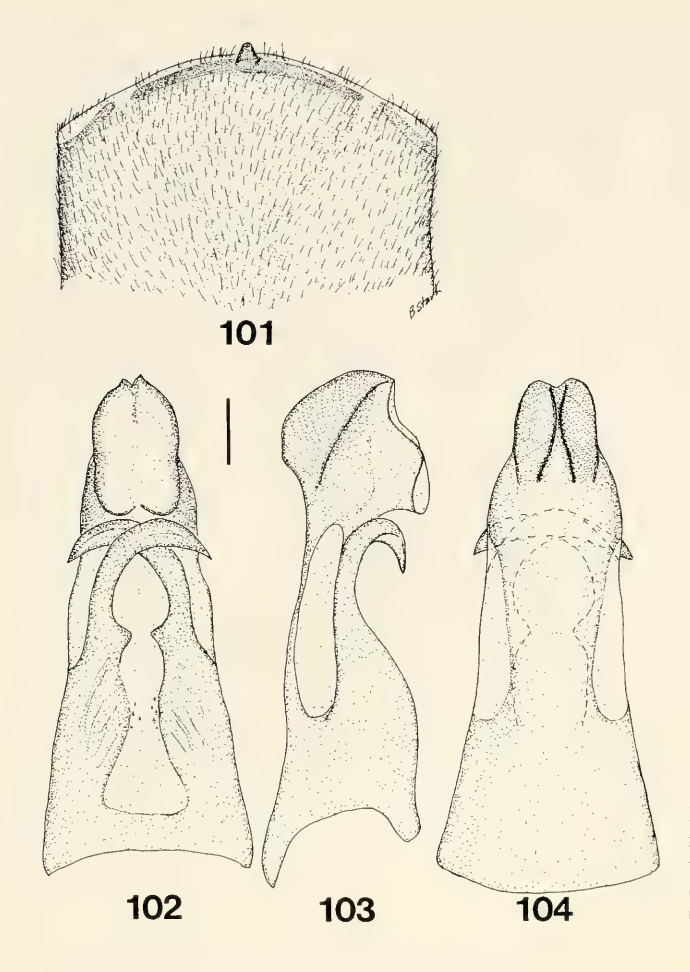
Female. Unknown.

Nymph. Unknown.

Etymology. Portilla, Spanish for "gap", refers to the space between the processes of the dorsal keel.

Anacroneuria quilla Stark & Zúñiga, spec. nov.
Figs 101-104, 149

Types. Holotype: ♂, Colombia, Risaralda, Termales de Santa Rosa de Cabal, 29 February 1984, O. S. Flint (USNM). – Paratypes (all from Colombia): 3♀♀, Valle del Cauca, Pance, 1700 m, Cuenca alta Rio Pance, 17 June 1996, J. M. Diaz, A. J. Cardoso Zúñiga (MEUV); 1♂, Valle del Cauca, Hato Viejo, Cuenca alta Rio Pance, 2180 m,



Figs 101-104. *Anacroneuria quilla*, spec. nov. **101.** ♂ sternum 9. **102.** Aedeagus ventral. **103.** Aedeagus lateral. **104.** Aedeagus dorsal. Scales: 0.3 mm (**101**), 0.15 mm (**102-104**).

11 March 1992, A. M. Rojas, M. del C. Zúñiga (MEUV); 1♂, 1♀, Valle del Cauca, Peñas Blancas, 2000 m, Cuenca alta Rio Cali, 27 June 1996, J. M. Diaz, A. J. Cardoso Zúñiga (MEUV).

Description

Adult habitus. Head yellow, lappets brown. Pronotum dark laterally with wide median yellow stripe. Wing membrane transparent, veins brown.

Male. Forewing length 16-18 mm. Hammer thimble shaped (Fig. 101). Aedeagal apex massive, hatchet shaped in lateral aspect (Fig. 103). Ventral aspect a large apically notched plateau (Fig. 102). Dorsal keel prominent (Fig. 104); hooks wide and scythe shaped.

Female. Forewing length 18 mm. Subgenital plate with four subequal lobes. Transverse sclerite of sternum nine absent; posterior margin of sternum nine notched. Median sclerite T-shaped, lateral setae prominent, median setae minute (Fig. 149).

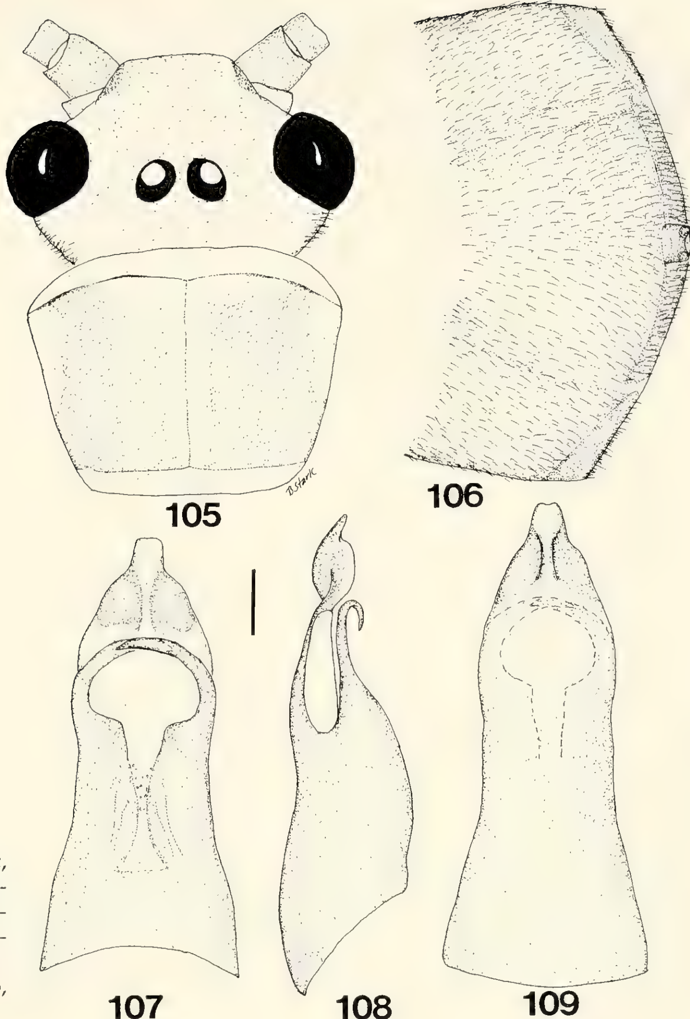
Nymph. Unknown.

Etymology. The species name refers to the strong dorsal keel on the aedeagal apex.

Anacroneuria regleta Stark & Rojas, spec. nov.

Figs 105-109

Types. Holotype: ♂, Colombia, Meta, Quebrada Blanca, 3 km W Restrepo, 11 February 1983, O. S. Flint (USNM).



Figs 105-109. *Anacroneuria regleta*, spec. nov. **105.** Head and pronotum. **106.** ♂ sternum 9. **107.** Aedeagus ventral. **108.** Aedeagus lateral. **109.** Aedeagus dorsal. Scales: 0.6 mm (**105**), 0.3 mm (**106**), 0.15 mm (**107- 109**).

Description

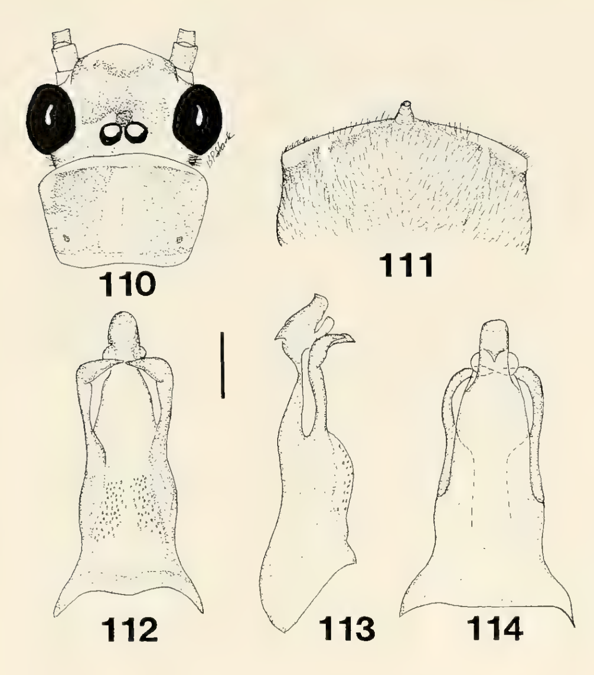
Adult habitus. Head pale yellow brown, lappets brown. Pronotum pale brown except for pale narrow mesal stripe and anterolateral margins (Fig. 105). Wing membrane transparent, veins brown.

Male. Forewing length 19 mm. Hammer excavated to form a saddle shaped apex; height less than basal diameter (Fig. 106). Aedeagal apex simple, truncate in ventral aspect with low rounded shoulders (Fig. 107). Lateral aspect strongly sinuate (Fig. 108); low dorsal keel formed by widely spaced ridges (Fig. 109). Hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name refers to the narrow corridor area within the dorsal keel.



Figs 110-114. *Anacroneuria rosita*, spec. nov. **110.** Head and pronotum. **111.** ♂ sternum 9. **112.** Aedeagus ventral. **113.** Aedeagus lateral. **114.** Aedeagus dorsal. Scales: 0.6 mm (**110**), 0.3 mm (**111**), 0.15 mm (**112-114**).

Anacroneuria rosita Stark & Rojas, spec. nov.

Figs 110-114

Types. Holotype: ♂, Colombia, Caquetá, Morelia, Rio Bodoquero, 430 m, 19-20 January 1969, Duckworth and Dietz (USNM).

Description

Adult habitus. Pale brown band between eyes arises from darker stalk extending forward from ocelli. Lappets brown, almost connected by a narrow V-shaped band. Pronotum mostly brown; median pale band narrow (Fig. 110). Wing membrane transparent, veins pale brown except for unpigmented costal margin.

Male. Forewing length 10 mm. Hammer almost conical, height greater than basal diameter (Fig. 111). Aedeagal apex slender, broadly rounded, bearing a ventral pair of membranous lobes and a wedge shaped middorsal process. Hooks turned inward abruptly and inflated in apical third (Figs 112-114).

Female. Unknown.

Nymph. Unknown.

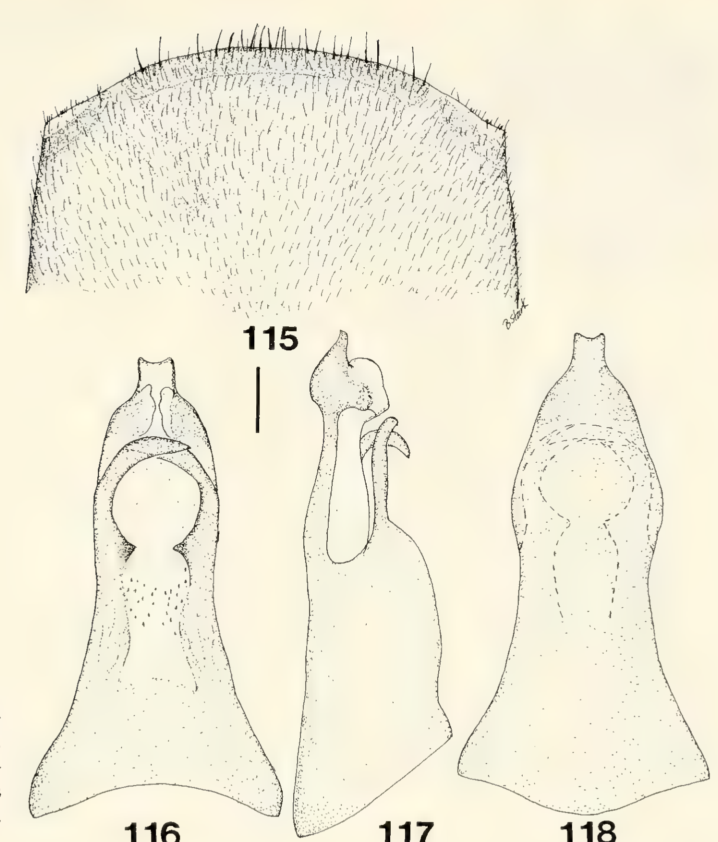
Etymology. Rosita, or small rose, refers to the small size and delicate beauty of this species.

Discussion. The lateral and dorsal aspects of the aedeagus of *A. rosita* are suggestive of *A. atrinota* Jewett, a Peruvian species, however the section of the aedeagal apex which projects beyond the hooks is much shorter in *A. rosita*, and the peculiar hooks are also distinctive.

Anacroneuria socapa Stark & Zúñiga, spec. nov.

Figs 115-118

Types. Holotype: ♂ (pinned), Colombia, Risaralda, Termales de Santa Rosa de Cabal, 29 February 1984 (USNM). Paratypes: 1♂ (pinned), same data as holotype (USNM); 1♂, Colombia, Antioquia, Piedras Blancas, 10 km E Medellin, 2 March 1984, O. S. Flint (USNM).



Figs 115-118. *Anacroneuria socapa*, spec. nov. **115.** ♂ sternum 9. **116.** Aedeagus ventral. **117.** Aedeagus lateral. **118.** Aedeagus dorsal. Scales: 0.3 mm (**115**), 0.15 mm (**116-118**).

Description

Adult habitus. Head yellow except for pair of dark spots forward of ocelli; lappets brown. Pronotum dark laterally, narrow mesal stripe pale. Wing membrane transparent, veins brown.

Male. Forewing length 21-22 mm. Hammer absent (Fig. 115). Aedeagal apex simple, slightly excavated in ventral aspect; area distal to shoulders about as long as wide (Fig. 116). Dorsal keel absent, hooks scythe shaped (Figs 116-118).

Female. Unknown.

Nymph. Unknown.

Etymology. Socapa refers to the secretive behavior of adult stoneflies.

Anacroneuria tejon Baena & Stark, spec. nov.

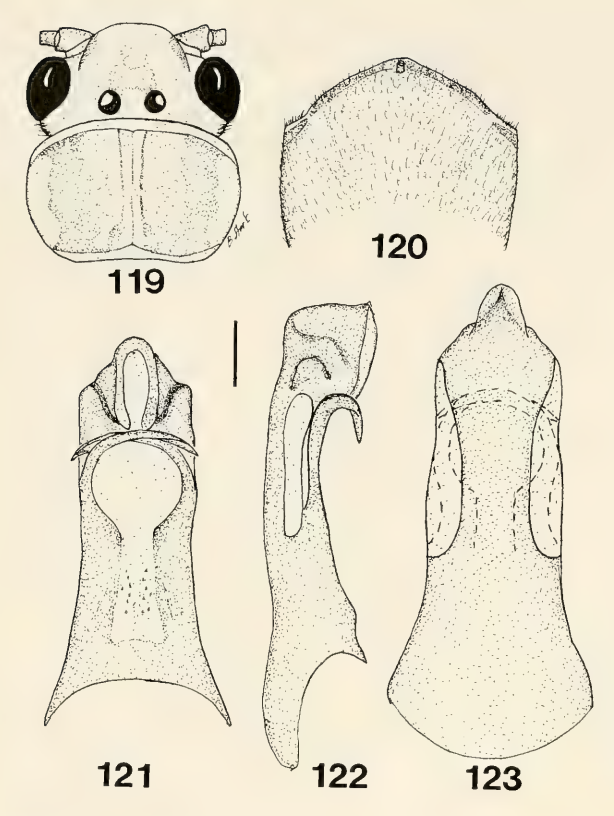
Figs 119-123

Types. Holotype: ♂, Colombia, Nariño, Reserva Natural La Planada, 1400 m, April 1994, F. Escobar (MEUV). – Paratype: 1♂, Colombia, Valle del Cauca, Pance, Cuenca alta Rio Pance, 1700 m, 17 June 1996, J. M. Diaz, A. J. Cardoso Zúñiga (MEUV).

Description

Adult habitus. Head pale with obscure brown area forward of ocelli; lappets dark brown. Pronotum with dark midlateral stripes and a pale median stripe (Fig. 119). Wing membrane transparent, veins pale brown.

Male. Forewing length 13 mm. Hammer a short cylinder as wide as long (Fig. 120). Aedeagal apex



Figs 119-123. *Anacroneuria tejon*, spec. nov. **119.** Head and pronotum. **120.** ♂ sternum 9. **121.** Aedeagus ventral. **122.** Aedeagus lateral. **123.** Aedeagus dorsal. Scales: 0.6 mm (**119**), 0.3 mm (**120**), 0.15 mm (**121-123**).

in lateral aspect sharply upturned and bearing ear shaped lobes and a sinuate keel (Fig. 122); dorsal aspect with sharp narrow, almost vertical keel (Fig. 123). Hooks long and slender (Fig. 121).

Female. Unknown.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, refers to the Rio Tejon basin where the holotype was collected.

Anacroneuria undulosa Stark & Rojas, spec. nov.

Figs 124-128

Types. Holotype: ♂, Colombia, Chocó, km 130, 86 km E Quibdó, 17 February 1983, O. S. Flint (USNM). – Paratype: 1♀, Colombia, Chocó, 52 km E Quibdó, 20 February 1983, O. S. Flint (USNM).

Description

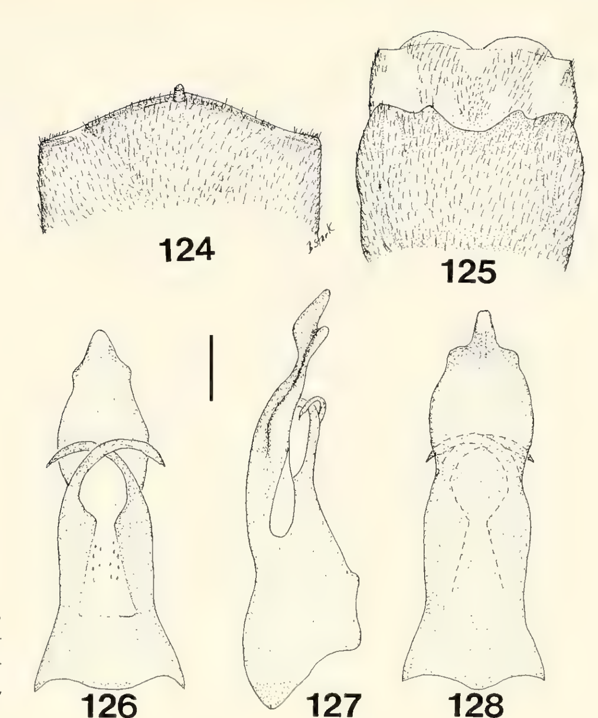
Adult habitus. Head and pronotum pale, pattern indistinct. Wing membrane transparent, veins pale.

Male. Forewing length 8 mm. Hammer subcylindrical, height about equal to basal diameter (Fig. 124). Aedeagal apex weakly trilobed, lateral lobes scarcely developed. Hooks slender, dorsal keel obscure; dorsolateral profile distinctly sinuate (Figs 126-128).

Female. Forewing length 10 mm. Subgenital plate weakly four lobed. Lateral lobes separated from narrow median lobes by indistinct notches; median lobes separated by wide U-shaped notch. Transverse sclerite of sternum 9 absent; setal patch M-shaped, without enlarged setae. A pair of membranous knobs extend into intersegmental membrane of sternum 9 (Fig. 125).

Nymph. Unknown.

Etymology. The species name is based on the undulant appearance of the aedeagus in lateral profile.



Figs 124-128. *Anacroneuria undulosa*, spec. nov. **124.** ♂ sternum 9. **125.** ♀ sterna 8-9. **126.** Aedeagus ventral. **127.** Aedeagus lateral. **128.** Aedeagus dorsal. Scales: 0.3 mm (**124, 125**), 0.15 mm (**126-128**).

Anacroneuria valle Zúñiga & Baena, spec. nov.
Figs 129-133

Types. Holotype: ♂, Colombia, Valle del Cauca, Rio Azul, Cuenca media Rio Calima, 550 m, 20 February 1994, A. M. Rojas, M. Baena, R. Aldana (MEUV).

Description

Adult habitus. Head and pronotum mostly yellow. Lappets and midlateral stripes on the pronotum pale brown (Fig. 129). Wing membrane transparent, veins yellow brown.

Male. Forewing length 10 mm. Hammer absent but a small circular depigmented spot located at hammer site (Fig. 130). Aedeagal apex simple and shallowly notched (Fig. 131). Dorsal keel low, hooks slender (Figs 131-133).

Female. Unknown.

Nymph. Unknown.

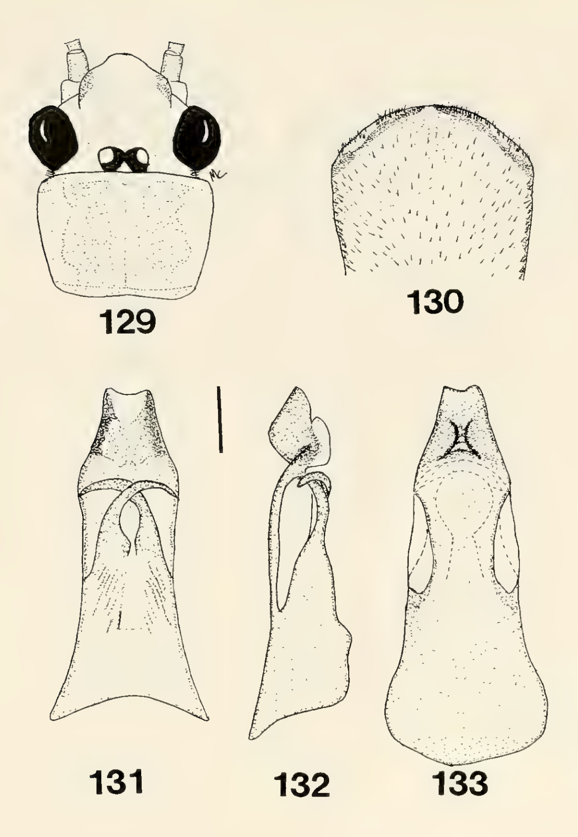
Etymology. The species name, used as a noun in apposition, is based on the Colombian Department where it was collected.

Anacroneuria paleta Stark
Figs 134-139

Anacroneuria paleta Stark, 1995: Holotype ♂, 4 km S Santo Domingo, Merida, Venezuela.

Diagnosis

Adult habitus. Head covered with diffuse brown pigment except for pale M-line and small oval spots near ocelli. Lappets brown. Brown pronotal lateral stripes irregular; pale mesal stripe narrow (Fig. 134). Wing membrane transparent, veins brown except for pale costal area.



Figs 129-133. *Anacroneuria valle,* spec. nov. **129.** Head and pronotum. **130.** ♂ sternum 9. **131.** Aedeagus ventral. **132.** Aedeagus lateral. **133.** Aedeagus dorsal. Scales: 0.6 mm (**129**), 0.3 mm (**130**), 0.15 mm (**131-132**).

Male. Forewing length 14 mm. Hammer cylindrical, height about equal to basal diameter (Fig. 135). Aedeagal apex trilobed; dorsal lobe scoop shaped, ventral lobes partially sclerotized along outer margins. Dorsal keel weak, hooks slender (Figs 136-138).

Female. Forewing length 20 mm. Subgenital plate bilobed; lobes obliquely truncate, notch narrow, V-shaped. Transverse sclerite of sternum 9 pale, setal patch triangular and without enlarged setae (Fig. 139).

Nymph. Unknown.

Examined material: Colombia: Dept. Santander, San Joaquin, 31 August 1965, W. D. Duckworth, 2♂♂, 2♀♀ (USNM).

Discussion. This series of Colombian specimens, previously determined by S. G. Jewett as *A. ohausiana* (Enderlein), is not closely related to that species (Zwick 1973). The males have a longer and less elevated dorsal aedeagal keel and the aedeagal apex is more broadly rounded than in the holotype of *A. paleta* (Stark 1995); the importance of these variations can be evaluated when a larger sample is available. The female was previously unknown.

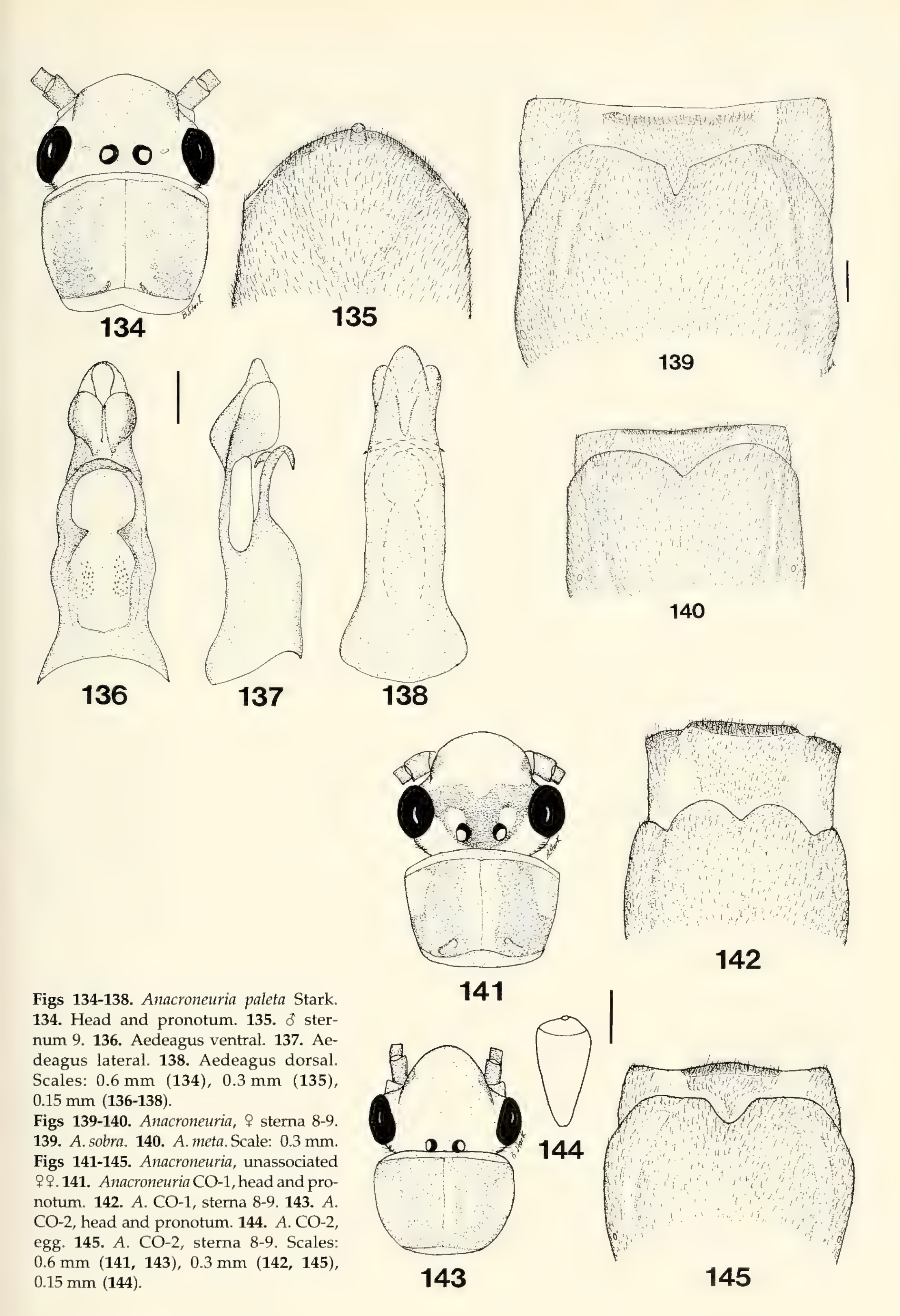
Unassociated females

Anacroneuria CO-1

Figs 141-142

Diagnosis

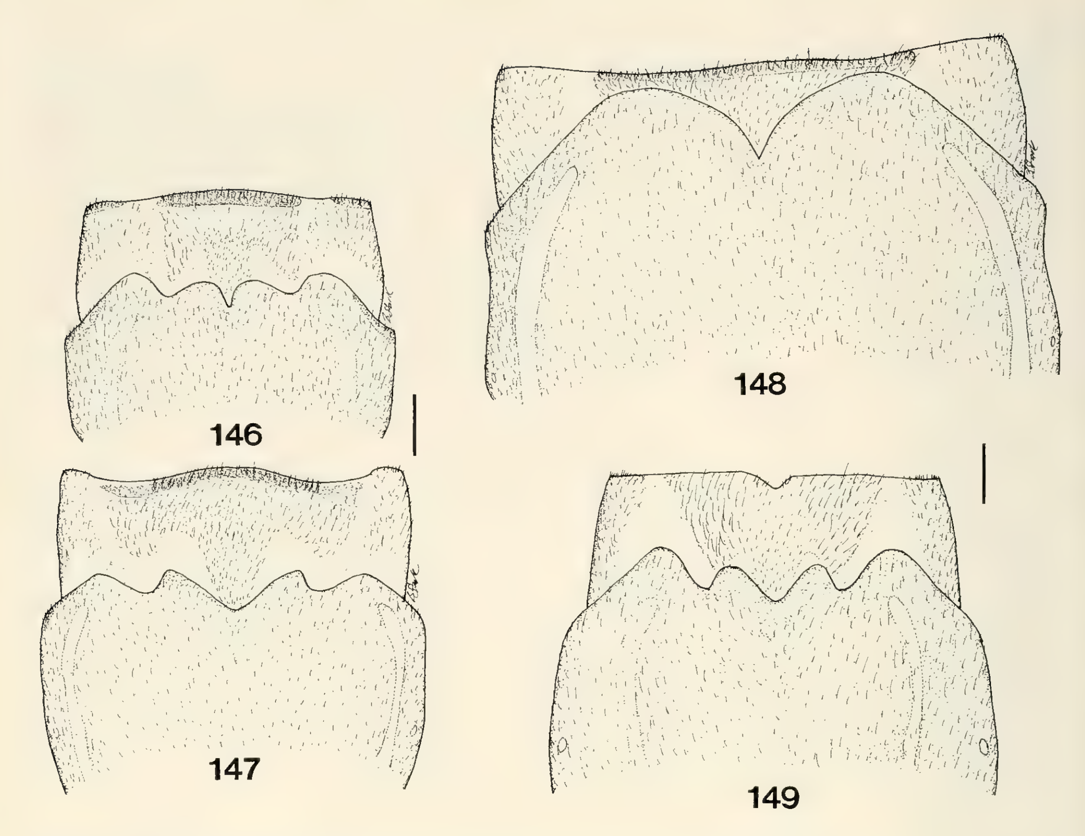
Adult habitus. Head dark brown over most of area between compound eyes. A pair of pale spots anterolateral to ocelli; anterior third of frons yellow, lappets brown. Pronotum with wide dark lateral bands; median stripe and anterolateral margins pale (Fig. 141). Wing membrane brown, veins brown



Figs 134-138. *Anacroneuria paleta* Stark. **134.** Head and pronotum. **135.** ♂ sternum 9. **136.** Aedeagus ventral. **137.** Aedeagus lateral. **138.** Aedeagus dorsal. Scales: 0.6 mm (**134**), 0.3 mm (**135**), 0.15 mm (**136-138**).

Figs 139-140. *Anacroneuria*, ♀ sterna 8-9. **139.** *A. sobra*. **140.** *A. meta*. Scale: 0.3 mm.

Figs 141-145. *Anacroneuria*, unassociated ♀♀. **141.** *Anacroneuria* CO-1, head and pronotum. **142.** *A.* CO-1, sterna 8-9. **143.** *A.* CO-2, head and pronotum. **144.** *A.* CO-2, egg. **145.** *A.* CO-2, sterna 8-9. Scales: 0.6 mm (**141, 143**), 0.3 mm (**142, 145**), 0.15 mm (**144**).



Figs 146-147. *Anacroneuria*, ♀ sterna 8-9. **146.** *A.* CO-3. **147.** *A.* CO-4. Scale: 0.3 mm.
Figs 148-149. *Anacroneuria*, ♀ sterna 8-9. **148.** *Anacroneuria* CO-5. **149.** *A. quilla*. Scale: 0.3 mm.

except for pale costal area.

Female. Forewing length 12 mm. Subgenital plate bilobed; lobes rounded, separated by a shallow V-shaped notch. Posterior margin of sternum nine with transverse sclerite; median field weakly sclerotized and covered by a sparse setal patch (Fig. 142).

Examined material: 1♀, Colombia: Amazonas, Leticia, 9 September 1969, D. H. Messersmith (USNM).

Anacroneuria CO-2

Figs 143-145

Diagnosis

Adult habitus. Head yellow, lappets brown. Median pale pronotal stripe narrow, dark lateral stripes broad; pale areas along midlateral margins (Fig. 143). Wing membrane transparent, veins brown.

Female. Forewing length 10 mm. Subgenital plate bilobed; lobes broad, margins truncate; notch moderately deep. Posterior margin of sternum nine with transverse sclerite; median field T-shaped, covered by a sparse setal patch (Fig. 145).

Egg. Length 0.34 mm, width 0.17 mm. Spindle shaped with collar small and button like (Fig. 144). Chorion smooth.

Examined material: 1♀, Colombia: Cundinamarca, Rio Sumapaz, 5 January 1959, G. E. Melgar, J. F. G. Clarke (USNM).

Anacroneuria CO-3
Fig. 146

Diagnosis
Adult habitus. Head mostly yellow; lappets and ocellar area pale brown. Median pale pronotal stripe wide, dark lateral stripes narrow. Wing membrane transparent, veins brown; costal area pale.

Female. Forewing length 13 mm. Subgenital plate 4-lobed. Lateral lobes longer, but subequal in width to median lobes. Posterior margin of sternum nine with transverse sclerite; median field T-shaped and sparsely setose (Fig. 146).

Examined material: 1♀, Colombia: Antioquia, Quebrada Hondo, 1450 M, 12 km SW Fredonia, 22 February 1983, O. S. Flint (USNM).

Anacroneuria CO-4
Fig. 147

Diagnosis
Adult habitus. Head yellow, lappets pale brown. Pronotum mostly yellow; diffuse anterolateral and posterolateral brown blotches form irregular stripes. Wing membrane transparent, veins pale.

Female. Forewing length 16-17 mm. Subgenital plate 4-lobed. Mesal lobes divergent, acute; lateral lobes low, rounded. Posterior margin of sternum nine with a long sinuate transverse sclerite; mesal field covered with T-shaped sparsely setose area (Fig. 147).

Examined material: 1♀, Colombia: Antioquia, Finca, Fernandes Sopetran, 14 February 1983, O. S. Flint (USNM); 1♀, Antioquia, KM 50, Rio Aurra, San Jeronimo, 14 February 1983, O. S. Flint (USNM).

Anacroneuria CO-5
Fig. 148

Diagnosis
Adult habitus. Head yellow, lappets pale brown. Pale mesal pronotal stripe wide, submarginal dark lateral stripes narrow. Wing membrane transparent, most veins pale, Cu brown.

Female. Forewing length 24-26 mm. Subgenital plate broadly bilobed, notch acute. Posterior margin of sternum nine with a narrow transverse sclerite; median field sparsely setose (Fig. 148).

Egg. Length 0.34 mm, width 0.18 mm. Spindle shaped with small button like collar. Chorion smooth.

Examined material: 6♀♀, Colombia: Risaralda, Termales de Santa Rosa de Cabal, 29 February 1984, C. M. and O. S. Flint (USNM).

Nomina dubia

Type specimens for the following species are missing and presumed lost, or they are badly damaged. Because no figures are given and the existing descriptions are not diagnostic, we are unable to apply these names to *Anacroneuria* populations.

Anacroneuria appollinaris (Navas, 1924). Type locality: Villavicencio, Colombia. Benedetto (pers. comm.) has studied the presumptive type specimen but we have no additional data.

Anacroneuria dimidiata (Navas, 1916). Type locality: Colombia. Considered nomen dubium by Illies (1966).

Anacroneuria flavilatera Klapálek, 1922. Type locality: Bogota, Colombia. Considered a valid species by Illies (1966).

Anacroneuria morio (Pictet, 1841). Type locality: Colombia. According to Zwick (1972) the holotype is seriously damaged and the aedeagus is lost. Despite this, Zwick suggests the distinctive size and dark coloration may permit recognition.

Anacroneuria ocellata (Navas, 1926). Type locality: Cali, Colombia. Considered nomen dubium by Illies (1966).

Anacroneuria plagiata (Navas, 1926). Type locality: Agnatal, Colombia. Considered nomen dubium by Illies (1966).

Anacroneuria ramealis (Navas, 1927). Type locality: Colombia. Considered nomen dubium by Illies (1966).

Anacroneuria tincta (Navas, 1916). Type locality: Colombia. Considered nomen dubium by Illies (1966).

Anacroneuria viduata (Navas, 1916). Type locality: Colombia. Considered nomen dubium by Illies (1966).

Acknowledgments

We are grateful to O. S. Flint, N. Adams and the United States National Museum of Natural History for the loan of specimens. P. Zwick made helpful comments on an early draft of the manuscript and helped with translations. The study was supported, in part by the Instituto Colombiano de Investigaciones y Proyectos especiales "Francisco Jose de Caldas"-COLCIENCIAS and Universidad del Valle.

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SPIXIANA	**22**	1	47–52	München, 01. März 1999	ISSN 0341-8391

Further notes on Migadopinae from the Falkland Islands

(Insecta, Coleoptera, Carabidae)

Martin Baehr

Baehr, M. (1999): Further notes on Migadopinae from the Falkland Islands (Insecta, Coleoptera, Carabidae). – Spixiana **22/1:** 47-52

Additional material collected on some of the smaller Islands of the Falkland Archipelago reveals a more complex taxonomic situation of the *Pseudomigadops falklandicus*-complex than mentioned in the most recent treatment (Baehr 1997). In accordance with the recently recorded sympatric occurrence of populations of *P. falklandicus handkei* Baehr and *P. falklandicus fuscus* Baehr on the small Sea Lion Island south of East Falkland Island both subspecies are raised to specific status.

Two additional taxa are described that clearly belong to the recently described taxa *fuscus* and *handkei*, respectively: *P. fuscus sericeus*, subspec. nov. occurring on Sea Lion Island, and *P. handkei punctatus*, subspec. nov. occurring on Saunders Island north of West Falkland Island.

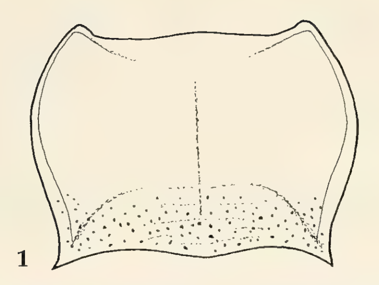
The presently known distribution pattern suggests the existence of a widespread species on East Falkland Island – and perhaps also West Falkland Island – (*P. falklandicus* Waterhouse) that is surrounded by different subspecies of the related species *P. fuscus* Baehr and *P. handkei* Baehr on certain smaller islands.

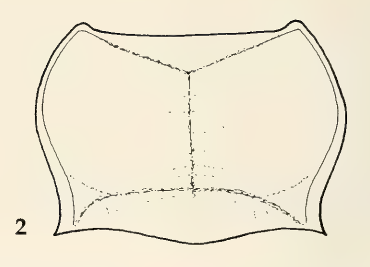
Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

Until recently, only one species of the genus *Pseudomigadops* (*P. falklandicus* Waterhouse) was recorded from the Falkland Islands (Jeannel 1939, Schweiger 1959, Roux & Voisin 1982). Recently, I described two subspecies of this species from small islands south of East Falkland Island and north of West Falkland Island, respectively (Baehr 1997), namely *P. falklandicus handkei* and *P. falklandicus fuscus*. Due to the still rather similar external and aedeagal morphology of both taxa, and in view of the occurrence on small islands in close neighbourship of the larger East Falkland and West Falkland Islands, respectively, I preferred to maintain the new taxa as subspecies of *P. falklandicus* rather than separate species. However, additional material recently received from Drs. K. Handke (Delmenhorst) and K. G. Bernhardt (Osnabrück), when the mentioned paper was just printed, revealed that the taxonomic situation is much more complex. The recently recorded sympatric occurrence of populations of both, *P. falklandicus handkei* and *P. falklandicus fuscus* on the small Sea Lion Island off the coast of East Falkland Island convinced me that both well distinguishable subspecies must be raised to specific status. Moreover, now I received representatives of two additional taxa that are closely related to the taxa *handkei* and *fuscus*, respectively, and which are best regarded as subspecies of those taxa. As a consequence, the taxa *handkei* and *fuscus* are herewith raised to specific status, and two new subspecies are described.

Measurements are similar to those in Baehr (1997).





Figs 1-2. Outline of pronotum. **1.** *Pseudomigadops handkei punctatus*, subspec. nov. **2.** *P. fuscus sericeus*, subspec. nov.

Note. Through an apparent printer error while computerizing the figures 1-3 (pronota of *P. f. falklandicus, P. falklandicus handkei*, and *P. falklandicus fuscus*) in my paper on the *Pseudomigadops* of the Falkland Islands (Baehr 1997), the three pronota appear much too narrow. To get a correct impression of the actual proportions, the pronota should be widened by a factor of about 40 %.

Types

The holotypes of the new subspecies are donated to the Zoologische Staatssammlung, München, though are kept as permanant loan in the working collection of the author (ZSM-CBM).

Pseudomigadops handkei Baehr (stat. nov.)

Pseudomigadops falklandicus handkei Baehr, 1997: p. 42; figs 2, 5.

Pseudomigadops handkei handkei Baehr (stat. nov.)

Pseudomigadops falklandicus handkei Baehr, 1997: p. 42; figs 2, 5.

This species was so far known only from the type series from Sea Lion Island south of East Falkland Island. Recently, I received an additional specimen from the same locality and with the same data that is distinguished from the type series by oblique rather than straight basal lateral border, and by slightly more extensively punctate base of the pronotum. The aedeagus, however, exactly matches that of the type series. The specimen is thus regarded an individual variation of *P. h. handkei.*

Pseudomigadops handkei punctatus, subspec. nov.

Figs 1, 3, 4

Types. Holotype: ♂, Falkland-Inseln, Saunders Island, 31.01.1995, leg. Dr. K. Handke (ZSM-CBM).

Diagnosis. The subspecies differs from the nominate subspecies by denser and coarser puncturation of the base of the pronotum, very acute, slightly outturned basal angles of the pronotum, and less arcuate aedeagus with longer excised upper part of the preapical surface.

Description

Measurements. Length: 7.5 mm; width: 3.8 mm. Ratios. Width/length of prothorax: 1.53; width base/apex of prothorax: 1.21; width widest diameter/base of prothorax: 1.17; width prothorax/head: 1.47.

Colour. As in nominate subspecies, elytra likewise with distinct greenish lustre.

Head. Similar to nominate subspecies.

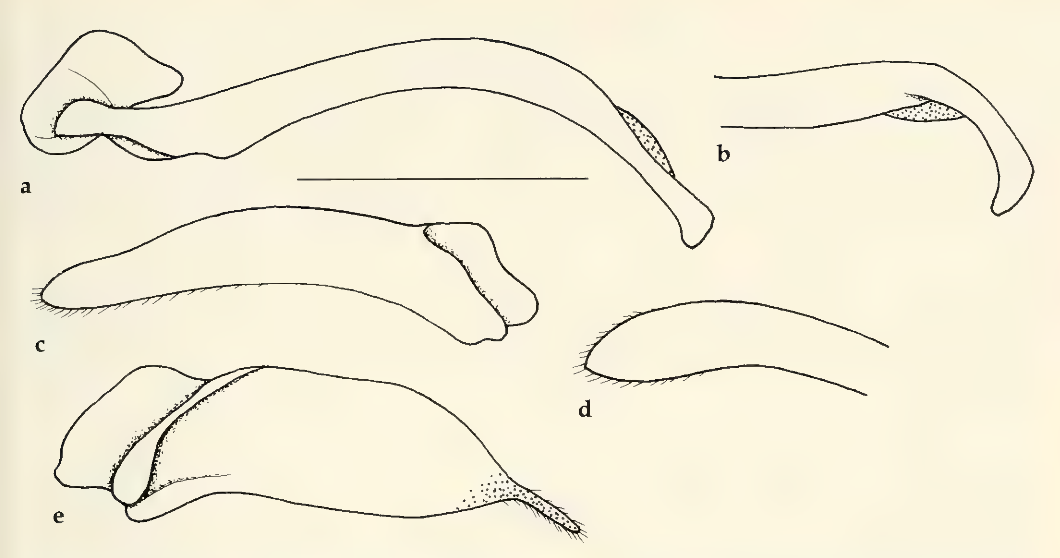


Fig. 3. *Pseudomigadops handkei punctatus*, subspec. nov. ♂ genitalia. a. Aedeagus, left side, lateral view. b. Aedeagus, apex from below. c. Right paramere, lateral view. d. Right paramere, apex, ventrolateral view. e. Left paramere, lateral view. Scale: 1 mm.

Pronotum (Fig. 1). Rather similar to nominate subspecies, but with markedly acute and posteriad **and** laterad produced basal angles; basal surface with coarser and denser puncturation.

Elytra. Similar to nominate subspecies.

Lower surface. Similar to nominate subspecies.

Legs. In male four basal tarsomeres of protarsus and three basal tarsomeres of mesotarsus widened and squamose.

♂ genitalia (Fig. 3). Rather similar to nominate subspecies, but lower surface of aedeagus slightly less curved, and the excised upper part of the preapical surface longer. Apex of right paramere more delicate.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution (Fig. 4). Saunders Island north of West Falkland Island, known only from type locality.

Habits. Unknown. Holotype collected at end of January.

Etymology. The name refers to the coarsely punctate base of the prothorax.

Pseudomigadops fuscus Baehr (stat. nov.)

Pseudomigadops falklandicus fuscus Baehr, 1997: p. 43; figs 3, 6.

Pseudomigadops fuscus fuscus Baehr (stat. nov.)

Pseudomigadops falklandicus fuscus Baehr, 1997: p. 43; figs 3, 6.

This subspecies is still known only from the type series from Pebble Island, north of West Falkland Island.

Pseudomigadops fuscus sericeus, subspec. nov.
Figs 2, 4

Types. Holotype: ♀, Falkland-Inseln, Sea Lion Island, 25.-27.1.1995, leg. Dr. K. Handke (ZSM-CBM).

Diagnosis. The subspecies differs from the nominate subspecies by markedly acute and laterad protruding basal angles of the pronotum, completely red 1st - 4th basal antennomeres, and less distinct puncturation though coarser microreticulation of the elytra, that give them a conspicuously sericeous lustre.

Description

Measurements. Length: 8.9 mm; width: 4.4 mm. Ratios. Width/length of prothorax: 1.51; width base/apex of prothorax: 1.35; width widest diameter/base of prothorax: 1.12; width prothorax/head: 1.55.

Colour. Rather similar to nominate subspecies, but 1st - 4th antennomeres completely red, without any infuscations.

Head. Similar to nominate subspecies.

Pronotum (Fig. 2). Rather similar to nominate subspecies, but with markedly acute and posteriad **and** laterad produced basal angles.

Elytra. Rather similar to nominate subspecies, but puncturation of striae weaker and microreticulation more pronounced and more sericeous; hence puncturation of striae even more inconspicuous.

Lower surface. Similar to nominate subspecies.

Legs. Similar to nominate subspecies. Structure of male protarsus and mesotarsus unknown.

♂ genitalia. Unknown.

♀ genitalia. As in nominate subspecies.

Variation. Unknown.

Distribution (Fig. 4). Sea Lion Island, south of East Falkland Island, known only from type locality.

Habits. Unknown. Holotype collected at end of January.

Etymology. The name refers to the markedly sericeous surface of the elytra.

Key to the *Pseudomigadops falklandicus*-complex on the Falkland Islands

For better recognition the figures in my previous paper (Baehr 1997) are included as **B97** fig.

1. Surface colour brown without any greenish lustre. Basal third of pronotum abruptly narrowed, lateral borders in basal part almost parallel (**B97** fig. 3), or outturned (Fig. 2). Aedeagus large, less curved near apex, distinctly widened in apical half (**B97** fig. 6) .... 2.

– Surface colour blackish-brown with distinct greenish lustre. Basal third of pronotum more evenly narrowed, lateral borders in basal part oblique (**B97** figs 1, 2). Aedeagus either smaller, more curved near apex, and apex but gently widened (Fig. 3; **B97** fig. 5;), or thinner, more curved and asymmetric, and not widened in apical half (**B97** fig. 4) .... 3.

2. Lateral borders of basal third of pronotum parallel, basal angles almost rectangular (**B97** fig. 3). 1st-4th antennomeres partly dark. Puncturation of the elytral striae coarser though microreticulation of intervals weaker. Pebble Island north of West Falkland Island .... *P. fuscus fuscus* Baehr

– Lateral borders of basal third of pronotum markedly outturned, basal angles acute (Fig. 2). 1st-4th antennomeres completely reddish. Puncturation of the elytral striae less coarse though microreticulation of intervals coarser. Sea Lion Island south of East Falkland Island .... *P. fuscus sericeus*, subspec. nov.

3. Larger species, length c. 8.5 mm. Pronotum densely and coarsely punctate across base and in lateral channel, lateral channel anteriorly wider (**B97** fig. 1). Femora and four basal antennomeres dark reddish-brown. Aedeagus large, in apical half not widened, with rather distinctly hook-shaped apex (**B97** fig. 4). East Falkland Island .... *P. falklandicus* (Waterhouse)

– Smaller species, length <7.5 mm. Pronotum less densely punctate across base and in lateral chan-



Fig. 4. Map of Falkland Islands with distribution of the *Pseudomigadops*-complex. 1. East Falkland Island. 2. West Falkland Island. 3. Sea Lion Island. 4. Pebble Island. 5. Saunders Island. *Pseudomigadops handkei handkei*: ●; *P. handkei punctatus*: ■; *P. fuscus fuscus*: ▼; *P. fuscus sericeus*: ▲. Scale: 25 km.

nel, lateral channel anteriorly narrow (**B97** fig. 2). Femora and four basal antennomeres light reddish. Aedeagus small, in apical half slightly widened, with barely hook-shaped apex (Fig. 3; **B97** fig. 5) .... 4.

4. Pronotum almost impunctate, basal angles rectangular (**B97** fig. 2). Aedeagus more arcuate, with shorter excised upper part of the preapical surface (**B97** fig. 5). Sea Lion Island south of East Falkland Island .... *P. handkei handkei* Baehr

– Pronotum more densely punctate, basal angles very acute, somewhat outturned (Fig. 1). Aedeagus less arcuate, with longer excised upper part of the preapical surface (Fig. 3). Saunders Island north of West Falkland Island .... *P. handkei punctatus*, subspec. nov.

Discussion

The discovery of a population of the taxon *fuscus* Baehr on the small Sea Lion Island south of East Falkland Island from where until now only the taxon *handkei* Baehr was recorded is evidence of the sympatric occurrence of both taxa that formerly were regarded subspecies of *P. falklandicus* Waterhouse. The latter is a species widespred on East Falkland Island and perhaps also West Falkland Island. On that reason both, *P. falklandicus handkei* and *P. falklandicus fuscus* herein are raised to full specific rank. This reclassification was also necessary, because in the meantime two slightly different forms were found one of which clearly belongs to *handkei*, the other to *fuscus*, respectively. Hence the taxonomic situation has become more complex and at present appears as following: An apparently widespread species on East Falkland Island – and probably also on West Falkland Island – (*P. falklandicus* Waterhouse) is encircled by populations of the related species *P. handkei* Baehr and *P. fuscus* Baehr on several of the smaller surrounding islands. Both these species gave rise to subspecies on certain smaller islands, at the present state of knowledge to one subspecies each. On one island at least (Sea Lion Island) both species occur sympatrically.

Thus, further more scrutinized collecting work on the Falkland Archipelago should settle mainly the following questions:

- the taxonomic status of the *Pseudomigadops* occurring on West Falkland Island;
- the degree to which the smaller surrounding islands are populated by *Pseudomigadops* species and to which known or yet undescribed taxa the occurring populations belong;
- which phylogenetic relations exist between the *Pseudomigadops* populations of the larger East Falkland and West Falkland Islands and the smaller surrounding islands.

On the basis of settling of these questions a better established scenario of the colonization of the Falkland Islands and of the further evolutive history of the *Pseudomigadops* could be outlined. At present, the complex taxonomic situation should be stressed, a situation that may appear even more complex in future.

At any rate, taxonomic radiation of the *Pseudomigadops falklandicus*-complex on the Falkland Archipelago must have been considerable, and this radiation most probably occurred in surprisingly recent times.

Acknowledgements

I am greatly indebted to Drs. K. Handke (Delmenhorst) and K. G. Bernhardt (Osnabrück), who kindly submitted additional material from Dr. Handke's trip to the Falkland Islands.

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Six new *Tanytarsus* species from Ghana, West Africa

(Insecta, Diptera, Chironomidae)

Torbjørn Ekrem

Ekrem, T. (1999): Six new *Tanytarsus* species from Ghana, West Africa (Insecta, Diptera, Chironomidae). – Spixiana **22/1:** 53-68

In this study, the male adults of six new *Tanytarsus* species, all with spines between the anal crests on the hypopygium, are described. The new species *Tanytarsus kakumensis, T. pseudocongus, T. saetheri, T. spiesi, T. superpenicillatus* and *T. tossai* are all recorded from Ghana, West Africa. *T. superpenicillatus* is also recorded from Tanzania. The study greatly increases the number of known *Tanytarsus* species from the Afrotropical region. An attempt to place the new species in the already existing European species-groups is shown to be difficult.

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Introduction

The genus *Tanytarsus* v.d. Wulp 1874, is one of the most species rich genera in the family Chironomidae as a whole, and definitely the largest genus of the tribe Tanytarsini. Twentyfour species are previously registered from the Afrotropical region (Freeman & Cranston 1980), but only 11 of these have spines between their anal crests (Freeman 1958, Lehmann 1979, 1981). During the work of reviewing the Afrotropical *Tanytarsus eminulus, gregarius, mendax* and *lugens* groups, six new species were discovered in the material collected by the NUFU (The Norwegian Universities' Committee for Development Research and Education) project in Ghana. The new species are described below.

Material, methods and morphology

The mounting procedure used is described by Sæther (1969). Morphological nomenclature follows Sæther (1980) with the corrections given by Sæther (1990). The different ratios and lengths measurements on legs and antennae, are taken as described by Schlee (1966), but calculated for all legs and given as ranges. All other measurements are given as full lengths or widths. The attachment of the anal point on the anal tergite is interspecific variable and often hard to distinguish without a lateral view of the hypopygium. Therefore, the anal point length is given as the length from the anterior begin of the anal crests to the apex of the anal point.

Localities

Ghana

Agumatsa Waterfalls, Wli, is located in the north-western part of the Volta region close to the Togo border. The upper part of the river at about 450 meters above sea level, has two large cascades and is rather fast flowing with stones and gravel as bottom substrate. Further down (225-335 meters elevations), the river runs more slowly and the bottom material consists of sand and mud. According to Hall & Swaine (1981) the forests in the area belong to the Dry Semi-Deciduous Fire Zone Subtype. Mean annual rainfall exceeds 1500 mm especially in the higher hills in the Volta Region (Hall & Swaine 1981).

Ankasa Game Production Reserve (5°17'N, 2°35'W), is a tropical rainforest consisting of wet evergreen forest. The low-land reserve (60-80 meters above sea level) is situated in the south-west part of the country at the border to Côte d'Ivoire. Annual rainfall is about 1750-2000 mm, and the area is rich in both fast and slow flowing rivers and streams. The forest canopy rarely exceeds 40 meters and is floristically very rich with a high diversity of species.

Boti Waterfalls (6°12'N, 0°14'W) is located north-west of the capital Accra and the small reserve covers an area of only 1.3 square km (0.5 square miles) at about 300 meters elevation. The river is fast flowing also below the waterfall, and the river substratum consists typically of sand, gravel and larger rocks. The area has a moist semi-deciduous south-east subtype forest (Hall & Swaine 1981). This forest type is dominated by tall evergreen trees with heights up to 60 meters and a discontinuous canopy. Annual rainfall is typically between 1200 and 1800 mm.

Kakum Forest Reserve (5°26'N, 1°19'W) is quite large, 212.4 square km (82.1 square miles) and has an altitude of about 150 meters. The dominating forest type is moist evergreen forest. The tallest trees are on average 43 meters. Deciduous trees form only a small portion of the forest canopy (less than 20 %) (Hall & Swaine 1981). The area is hilly with numerous small streams draining into the Kakum River. The water current is usually slow, and the substrate varies from silt and sand to gravel and stones. Annual rainfall is between 1200 and 1800 mm.

Subri Stream (6°11'N, 0°31'W) near Kibi. The collection site is located within the upland evergreen forest, which occurs in the isolated hill ranges (500-750 m elevations) in the area. The hills are steep with flat summits. Reduced temperatures, high rainfall and mistiness is typical of the area. The forests are very uneven, thickets, swamps and grassland alternates with patches of closed canopy. The soils which are rich in clays are too shallow to support large trees, and the largest trees rarely exceeds 45 meters (Hall & Swaine 1981).

Tanzania

Kaputu Stream, Mazumbai Forest Reserve, West Usambara Mts. is located in North-East Tanzania. The stream originates at 1860 meters above sea level and flows through nearly undisturbed evergreen montane forest down to the collection site at about 1400 meters where it ends in a marshy area. The substrate at the collection site is composed of fine sand, mud and larger stones. The stable coastal climate supports one of the oldest forests in Africa, which is one of the most interesting endemic centres in Africa (Andersen & Johanson 1992).

Tanytarsus kakumensis, spec. nov.
Fig. 1

Type material. Holotype: ♂, abdomen, wings and legs, Ghana, Central Region, Kakum Forest Reserve, Malaise trap, 8-18.XI.1994. – Paratype: 1♂, as holotype. All type material in Museum of Zoology, Bergen, Norway (ZMBN Type No. 304).

Etymology. The new species is named after its type locality Kakum Forest Reserve.

Diagnosis. *T. kakumensis,* spec. nov. is separable from other *Tanytarsus* species by the following combination of characters on the hypopygium: Relatively long anal point; several spines between well developed anal crests; tergite bands separated, reaching anal crests; superior volsella simple without a higher "plateau", with 5 dorsal setae, 2 median setae; digitus minute; median volsella well developed with branched lamellae apically in addition to several strong setose lamellae on basal half; inferior volsella with only a few dorsomedian microtrichia; gonostyli extraordinary short.

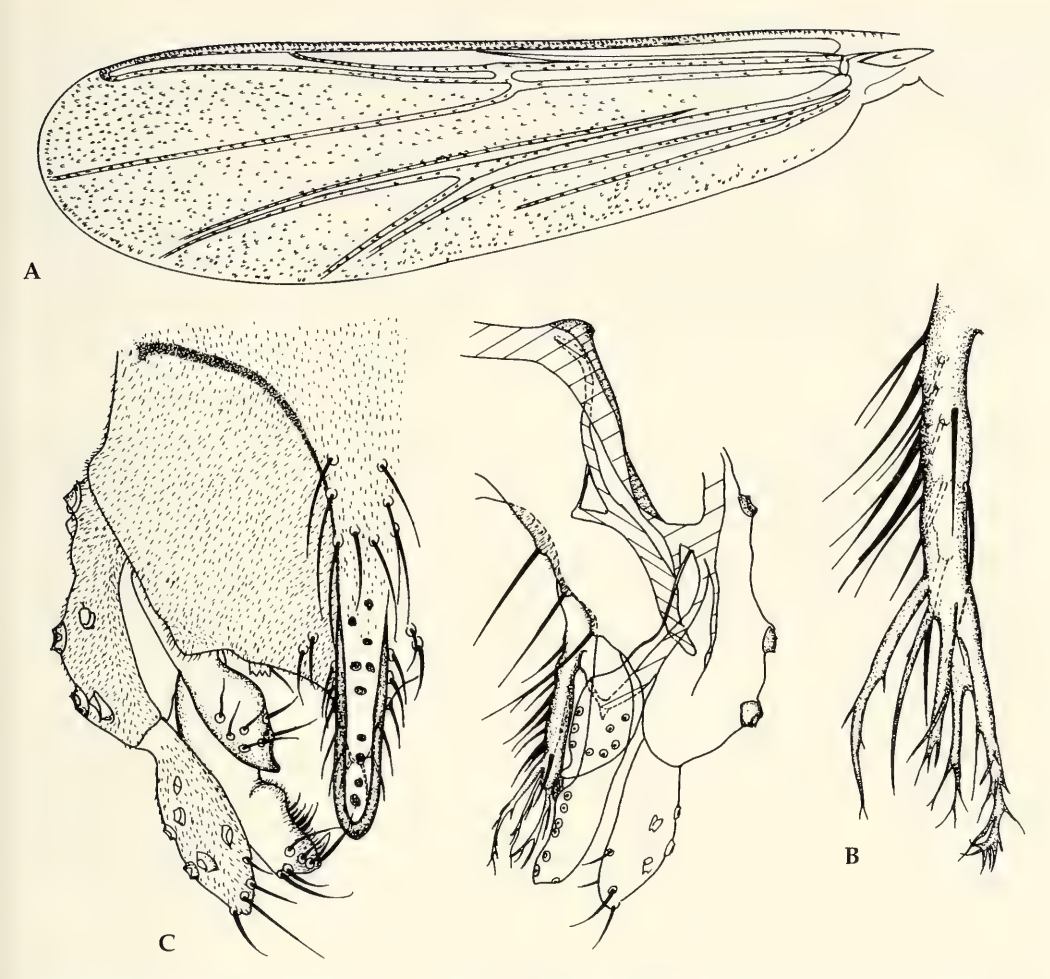


Fig. 1. *Tanytarsus kakumensis*, spec. nov. **A.** Wing. **B.** Median volsella. **C.** Hypopygium dorsal and ventral view.

Comments. The description of *Tanytarsus kakumensis* is based only on the hypopygium, abdomen, wings and legs for the following reason: The two slides with the two specimens contains two morphological different heads as well as thoraxes. This difference is much larger than what is considered normal intraspecific variation. Since both specimens are from the same locality and exactly the same Malaise trap, it is likely that one head and one thorax from one of the specimens has been switched with another Chironominae during the mounting procedure.

Description

Male imago (n=2).

Wing length. 1.64-1.71 mm.

Coloration. Cleared specimens with dark bands basally on tibiae of mid and hind legs in addition to apically on femur, tibiae, ta_1 and ta_2 of all legs; wings transparent; abdomen light greenish with brown transverse bands on tergite II, III, VI, VII and VIII.

Wing (Fig. 1A). VR 1.20. Setation: Brachiolum 1 seta, Sc bare, R with 25-31 setae, R_1 with 22-30, R_{4+5} with 39-46, M with 7-9, RM bare, M_{1+2} with 40-41, M_{3+4} with 22, Cu with 13-19, Cu_1 with 15-16, PCu with 26-28 and An with 22-26 setae. Cells: m bare, r_{4+5} with about 150 setae, m_{1+2} with about 190 including false vein, m_{3+4} with about 60-70, cu and an combined with about 110-140 setae.

Legs. Spur on front tibia 23-32 µm long. Spurs of middle tibia 39-45 µm long including 13-16 µm long comb and 23 µm long including 13 µm long comb; of hind tibia 55-64 µm including 16 µm comb and 23-31µm long including 13-16 µm long comb. Lengths (in µm, n = 1-2) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	462-491	229-233	523-578	300-307	242-245	184	100-103
p_2	423-459	359-384	226	97	64	39	39
p_3	459-481	423-488	304-329	161-178	158-168	97	39-52

	LR	BV	SV	BR
p_1	2.33-2.49	1.47-1.56	1.25-1.32	2.4-2.8
p_2	0.59	4.47	3.73	3.3
p_3	0.68-0.72	2.53-2.70	2.90-2.94	4.2

Hypopygium (Fig. 1C). Tergite IX 86-103 µm long with 6-8 relatively long, median setae, 16 apical setae. Anal point 49-53 µm long, 12 µm wide at base, 8 µm wide at apex. Anal point with well developed anal crests with 8-11 robust spines in between. Anal tergite bands separated, strongly curved anally, connecting with anal crests. Transverse sternapodeme 47-51 µm long, phallapodeme 82-90 µm long. Gonocoxite 88-90 µm long. Gonostylus short, only 49 µm long with about 4 median directed setae. Superior volsella simple, inverse drop-shaped, bearing 5 small setae dorsally and 2 setae medially; dorsolateral field of microtrichia absent. Digitus short and delicate. Median volsella (Fig. 1B) 70-74 µm long bearing about 12 normal simple and 4 branched apical lamellae. Inferior volsella almost completely without microtrichia on dorsal side, 66-70 µm long, with about 10 strong, orally directed setae placed both dorsally and ventrally. HR 1.79-1.83.

Systematic position. Using the key given to European *Tanytarsus* by Reiss and Fittkau (1971), *T. kakumensis* keys out to the *lugens*-group. This is true however, only if one ignores the last criteria that states: "Bands on anal tergite are not parallel distally, and do not reach the paired anal combs" (Reiss & Fittkau 1971). The new species also differentiates from the former two European species in the group, *T. lugens* Kieffer and *T. bathophilus* Kieffer, by having short gonostyli and long median volsellae without broad lamellae.

Tanytarsus pseudocongus, spec. nov.

Fig. 2

Type material. Holotype: ♂, Ghana, Western Region, Ankasa Game Production Reserve, Malaise trap, 7-11.XII.1993. – Paratype 1♂, Ghana, Volta Region, Wli, Agumatsa Waterfalls, Malaise trap, 17-20.XI.1993. All type material in Museum of Zoology, Bergen, Norway (ZMBN. Type No. 305).

Etymology. The name *"pseudocongus"* reflects the similarities in morphology to *Tanytarsus congus* Lehmann.

Diagnosis. *T. pseudocongus*, spec. nov. is separable from other *Tanytarsus* species by the following combination of characters: AR less than 0.45; LR less than 2.90; hypopygium: Spines in one row between well developed anal crests; superior volsella oval with a few microtrichia spread between 4-5 dorsal setae and 2 median setae where 1 is sitting on a small ventral projection; digitus with a swollen apex reaching beyond superior volsella at its median posterior margin, carrying 1 seta placed basally; median volsella relatively short with 3 distal, feathery lamellae in addition to 2 simple lamellae.

Description

Male imago (n=2).

Total length 1.84-1.87 mm. Wing length 0.94-1.03 mm. Total length/wing length 1.79-1.89.

Coloration. Cleared specimens with head light yellowish, dark brown antennae and eyes; thorax as well as abdomen and legs yellowish.

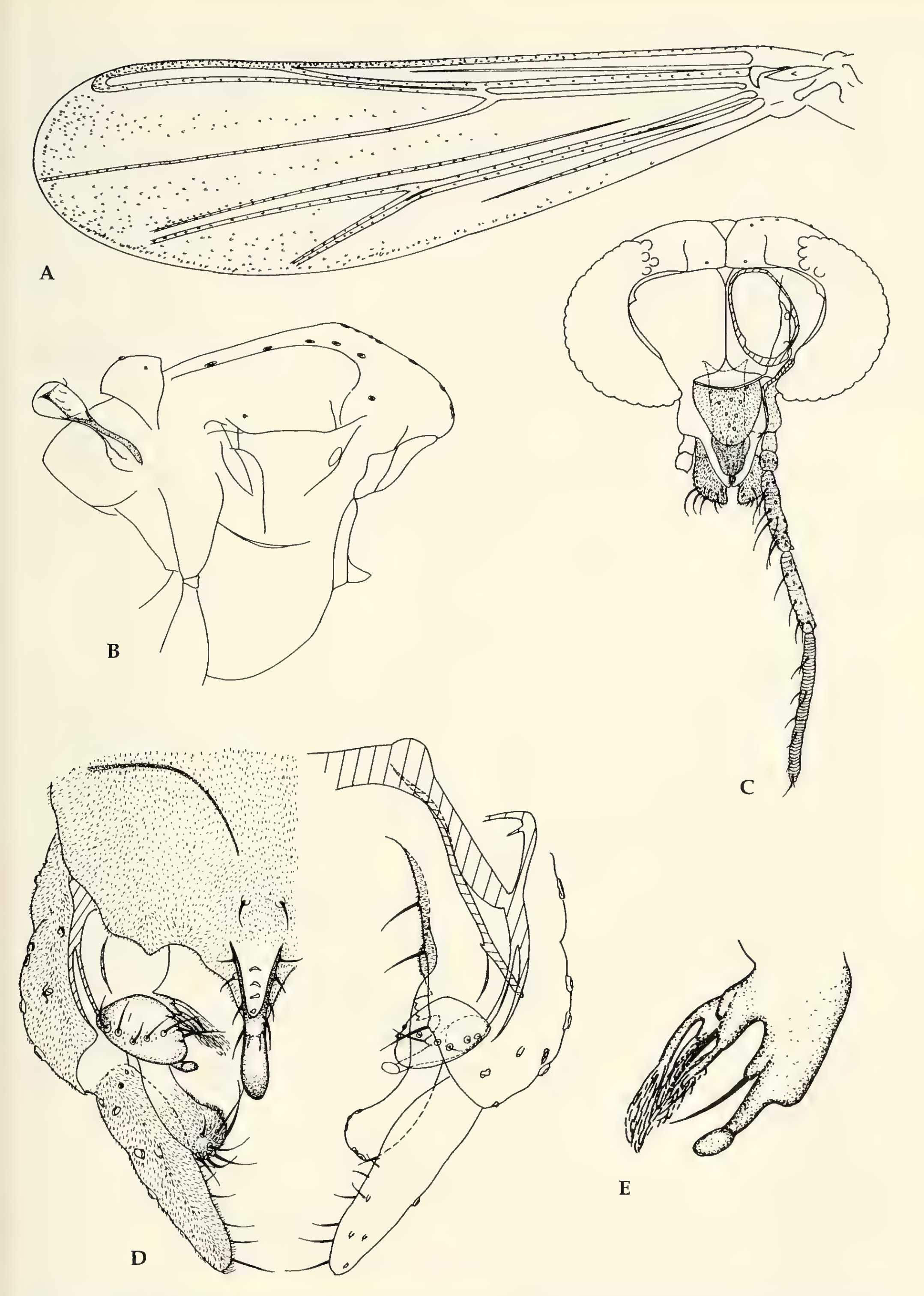


Fig. 2. *Tanytarsus pseudocongus*, spec. nov. **A.** Wing. **B.** Thorax. **C.** Head. **D.** Hypopygium dorsal and ventral view. **E.** Digitus and median volsella.

Head (Fig. 2C). Antennae normally developed with AR 0.38-0.40. Thirteenth flagellomere 158-181 µm long. Longest antennal seta about 400 µm long. Distance between eyes 145-149 µm. Small frontal tubercles. Temporal setae 7-8; 2 inner verticals, 2-3 outer verticals, 3 postorbitals. Clypeus 52-55 µm long with about 11 setae. Tentorium 81 µm long, 19 µm wide at sieve plate. Stipes 84-87 µm long. Cibarial pump with 2 pairs of ventrolateral and one pair ventromedian sensorial setae, width of cibarial pump 36-39 µm. Lengths of palp segments (in µm): 23-26, 26, 84, 87, 149.

Thorax (Fig. 2B). Dorsocentrals 5-6, acrostichals 10-11, prealars 1. Scutellum with 4 setae. 4 setae on halteres.

Wing (Fig. 2A). VR 1.79-1.99. Setation: Brachiolum 1 seta, Sc without setae, R with 11-15, R_1 with 13, R_{4+5} with 16-23, M_{1+2} with 23-24, M_{3+4} with 12-20, Cu with 1-11, Cu_1 with 7-13, PCu with 3-17 and An with 6-14 setae. Cells: m bare, r_{4+5} with 61-95 setae, m_{1+2} with 65-120 including false vein, m_{3+4} with 23-52, cu and an combined with 1-48 setae.

Legs. Spur on front tibia 23-26 µm long. Spurs of middle tibia 26-32 µm long including 13 µm long comb and 19-29 µm long including 13-16 µm long comb; of hind tibia both spurs 29-39 µm including 13-19 µm comb. Lengths (in µm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	462-514	226-252	646-685	317-320	249-262	197-200	74-87
p_2	426-494	349-404	213-216	90-94	55-58	39-42	29-36
p_3	494-507	449-504	313-320	181-187	165-171	97-100	52

	LR	BV	SV	BR
p_1	2.72-2.86	1.59-1.67	1.04-1.15	2.8-3.0
p_2	0.54-0.62	4.65-4.86	3.58-4.15	4.0-4.4
p_3	0.63-0.70	2.52-2.61	2.98-3.16	5.1-5.5

Hypopygium (Fig. 2D). Tergite IX 74-82 µm long with 2 short, median and 12-16 apical setae. Anal point 37-47 µm long, 12 µm wide at base, 4-6 µm wide at apex. Anal point with well developed anal crests with 4 robust spines in between. Anal tergite bands curved towards, not reaching anal point or connecting with each other. Transverse sternapodeme 31-39 µm long, phallapodeme 70-74 µm long. Gonocoxite 68-76 µm long. Gonostylus 66-70 µm long. Superior volsella bearing 4-5 small setae dorsally, one setae dorsomedially and one seta ventromedially on a small projection; microtrichia present between dorsal setae. Digitus long (Fig. 2E), extending well beyond the medial side of superior volsella, with a dorsal knob apically, and 1 seta placed at its base. Median volsella (Fig. 2E) short and stump, 4-8 µm long with 2 simple lamellae in addition to 3 strong 16-26 µm long, feathery lamellae. Inferior volsella somewhat club-shaped, 49-55 µm long, with about 6 strong setae directed both anally and orally. HR 0.97-1.16, HV 2.63-2.83.

Systematic position. *T. pseudocongus* does not fit perfectly in any species-group given by Reiss and Fittkau (1971). If one ignores that the digitus does not extend beyond the superior volsella by at least half its length, the new species ends up in the *chinyensis*-group. Not doing so, will place the new species in the morphological more different *mendax*-group (Cranston et al. 1989) = *holochlorus*-group in Reiss & Fittkau (1971) . In the *chinyensis*-group, *T. pseudocongus* has a hypopygium similar to that of *T. curticornis* Kieffer and *T. brundini* Lindeberg, but differs by having a shorter digitus baring one basal seta, and a larger median volsella.

Tanytarsus saetheri, spec. nov.

Fig. 3

Type material. Holotype: ♂, Ghana, Western Region, Ankasa Game Production Reserve, Malaise trap, 6-12.XII.1993. – Paratypes: 2♂♂, as holotype but collected in Light trap. All type material in Museum of Zoology, Bergen, Norway (ZMBN Type No. 306).

Etymology. The new species is named in honour of Prof. Ole A. Sæther at University of Bergen for his excellent work on chironomids.

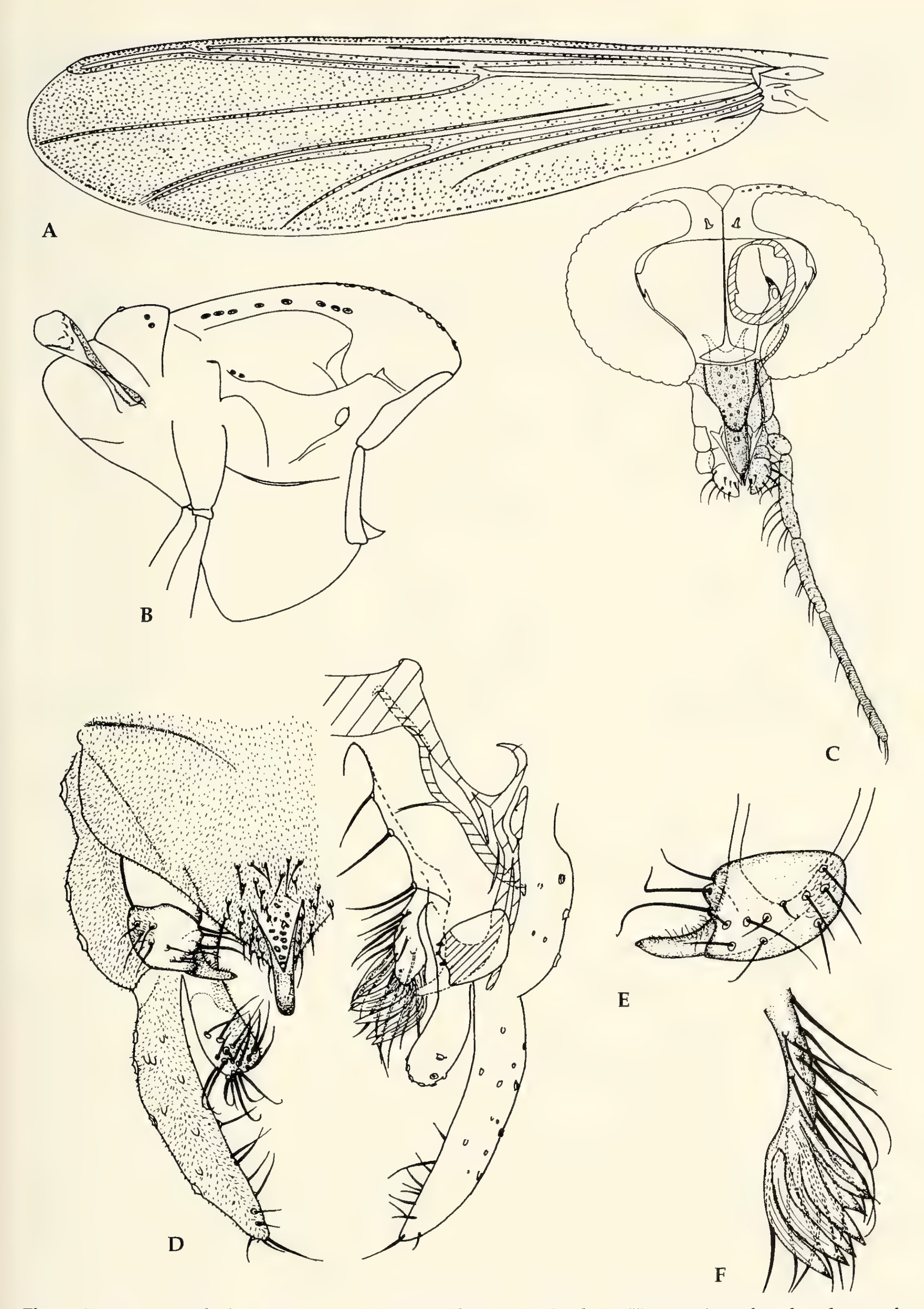


Fig. 3. *Tanytarsus saetheri,* spec. nov. **A.** Wing. **B.** Thorax. **C.** Head. **D.** Hypopygium dorsal and ventral view. **E.** Superior volsella with digitus. **F.** Median volsella.

Diagnosis. *Tanytarsus saetheri,* spec. nov. is separable from other *Tanytarsus* species by the following combination of characters: Large species, about 3 mm long; AR about 1.15; large cephalic tubercles; thorax light brownish with only one brown median mesonotal stripe; hypopygium: Spines in one row between well developed anal crests; superior volsella oval with concave median margin, about 10 dorsal setae, 3 apical setae on small projections and a field of dorsolateral microtrichia; digitus long, extending well beyond apex of superior volsella, with long microtrichia on oral margin; median volsella well developed with median directed, lamellae dorsoapically in addition to simple lamellae ventroapically and on basal half; inferior volsella without microtrichia on dorsolateral half.

Description

Male imago (n=2).

Total length 2.95-2.99 mm. Wing length 1.64-1.71 mm. Total length/wing length 1.73-1.82.

Coloration. Cleared specimens with head light yellowish, a little darker reddish coloured antennae and eyes; thorax light brownish with darker median scutum; legs light brown; abdomen light greenish with apodemes in hypopygium brown.

Head (Fig. 3C). AR 1.13-1.20. Thirteenth flagellomere 652-659 µm long, longest antennal seta about 660 µm long. Large eyes with strong dorsomedian elongation. Distance between eyes 68-71 µm. Large cephalic tubercles. Temporal setae 10-11; 3-4 inner verticals, 3 outer verticals, 4 postorbitals. Clypeus 103-107 µm long with 12-14 setae. Tentorium 136 µm long, 39 µm wide at sieve plate. Stipes 165-178 µm long, 10 µm wide. Cibarial pump with 3-4 small sensorial setae ventrolaterally on each side, width of cibarial pump 58-61 µm. Lengths of palp segments (in µm): 36-39, 39, 152, 142, 258.

Thorax (Fig. 3B). Dorsocentrals 5-8, acrostichals 13-15, prealars 2. Scutellum with 4-6 setae. 5-6 setae on halteres.

Wing (Fig. 3A). VR 1.11-1.15. Setation: Brachiolum 1 seta, Sc with 50-57 setae, R with 46-48, R_1 with 63-80, R_{4+5} with 90-104, M with 1-3, RM bare, M_{1+2} with 72-84, M_{3+4} with 65-68, Cu with 33-49, Cu_1 with 30-32, PCu with 76-98 and An with 50-54 setae. Cells: m bare, r_{4+5} with more than 200 setae, m_{1+2} with more than 200 including false vein, m_{3+4} with about 200, cu and an combined with about 150 setae.

Legs. Conspicuously more setae toward apexes of mid and hind tibiae. Spur on front tibia seems broken off on both specimens. Spurs of middle tibia 42-52 µm long including 23 µm long comb and 36 µm long including 19 µm long comb; of hind tibia 55-64 µm including 16-23 µm comb and 36 µm long including 19 µm long comb. Lengths (in µm, n=1-2) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	1082-1111	394-433	–	–	–	–	–
p_2	879-888	791-807	481	242	178	90	55
p_3	917-943	879-888	640	365	339	184	71

	LR	BV	SV	BR
p_1	2.56*	–	1.46*	–
p_2	0.60	3.83	3.50	6.9
p_3	0.72	2.59	2.88	4.6

Hypopygium (Fig. 3D). Tergite IX 111-119 µm long with 12 median and 22-24 apical setae. Anal point 41-49 µm long, 12-25 µm wide at base, 8 µm wide at apex. Anal point with well developed anal crests with 14-22 robust spurs in between. Anal tergite bands slightly curved anally, not connecting with each other or anal crests. Transverse sternapodeme 72-74 µm long, phallapodeme 117-121 µm long. Gonocoxite 144-146 µm long. Gonostylus 129-131 µm long with about 9 median directed setae. Superior volsella (Fig. 3E) oval with concave median margin, bearing 7-10 small setae dorsally and 3 setae apically on small projections; dorsolateral field of microtrichia present. Digitus (Fig. 3E) long, extending far beyond apex of superior volsella, with long microtrichia on anterior margin. Median volsella (Fig. 3F) 85-88 µm long including 16-17, 41-45 µm long setae ventroapically and on basal half in addition to about 7 medially directed lamelliform setae. Inferior volsella somewhat club-shaped, 92 µm long, with about 15 strong setae directed both orally and anally. HR 1.09-1.13, HV 2.28-2.44.

Comments. As shown above, three specimens where collected at the type locality. However, one of the designated paratypes looks freshly hatched and shows large diversion in length measures, VR and AR. The specimen also has folded wings. For these reasons, this specimen has not been included in the description except in the parts where no other data where available (LR and SV of foreleg, marked with an asterisk). Based on the morphology of the hypopygium, there is no doubt that this specimen is a member of the above described species.

Systematic position. *T. saetheri* keys out to the *eminulus*-group if regarding the few microtrichiae between the spines on the anal point to be "a field of microtrichia between the anal crests" (Reiss & Fittkau 1971) and ignoring that the groups of spines between the anal crests must be in one longitudinal row. Regarding no microtrichia as present between the anal crests, the new species will key out to the morphological more different *mendax*-group. There are however, no species in the *eminulus*-group either that show great morphological similarities and a full revision of the genus might be necessary to find or create a group for *T. saetheri*.

Tanytarsus spiesi, spec. nov.

Fig 4

Type material. Holotype: ♂, Ghana, Central Region, Kakum Forest Reserve, Malaise trap, 8-18.XI.1994. Type material in Museum of Zoology, Bergen, Norway (ZMBN Type No. 307).

Etymology. The new species is named after Martin Spies who enlightened me with good discussions and helpful comments during my stay at the Zoologische Staatssammlung, München.

Diagnosis. *Tanytarsus spiesi,* spec. nov. is separable from other *Tanytarsus* by the following combination of characters: Large frontal tubercles; strong, brown thoracic markings on scutum, preepisternum, median anepisternum II and postnotum; hypopygium: Relatively long and narrow anal point; spurs in one cluster between anal crests; tergite bands separated, reaching anal crests; superior volsella with 3 dorsal setae and 3 apical setae; digitus long, extending far beyond apex of superior volsella; median volsella well developed with branched lamellae apically in addition to several setose lamellae on basal half; inferior volsella medially bent.

Description

Male imago (n=1).

Total length 1.71 mm. Wing length 1.03 mm. Total length/wing length 1.67.

Coloration. Cleared specimens with head light yellowish, brown antennae and eyes, dark brown pedicilli; thorax light yellowish with dark brown patches on scutum dorsally and laterally under parapsidal suture, on median anepisternum II, preepisternum and postnotum; legs brown; abdomen light greenish.

Head (Fig. 4C). AR 0.84. Pedicel 68 µm long. Thirteenth flagellomere 323 µm long, longest antennal seta about 400 µm long. Eyes with weak dorsomedian elongation. Distance between eyes 171 µm. Temporal setae 8; 3 inner verticals, 2 outer verticals, 3 postorbitals. Clypeus 39 µm long with 10 setae. Tentorium 81 µm long, 19 µm wide at sieve plate. Stipes 100 µm long and 6 µm wide. Cibarial pump with 2 small sensorial setae ventrolaterally on each side and one pair ventromedially towards apex, width of cibarial pump 42 µm. Lengths of palp segments (in µm): 23, 23, 90, 90, 149.

Thorax (Fig. 4B). Dorsocentrals 6-7, acrostichals 16, prealars 1. Scutellum with 4 setae. 6 setae on halteres.

Wing (Fig. 4A). VR 1.30. Setation: Brachiolum 1 seta, Sc bare, R with 14 setae, R_1 with 14, R_{4+5} with 22, M bare, RM bare, M_{1+2} with 27, M_{3+4} with 18, Cu with 7, Cu_1 with 12, PCu with 16 and An with 15 setae. Cells: m bare, r_{4+5} with 86 setae, m_{1+2} with 127 including false vein, m_{3+4} with 27, cu and an combined with 8 setae.

Legs. Spur on front tibia 23 µm long. Spurs of middle tibia 23µm long including 10 µm long comb and 21µm long including 13 µm long comb; of hind tibia 29 µm including 13 µm comb and 23 µm long including 13µm long comb. Lengths (in µm,) and proportions of legs:

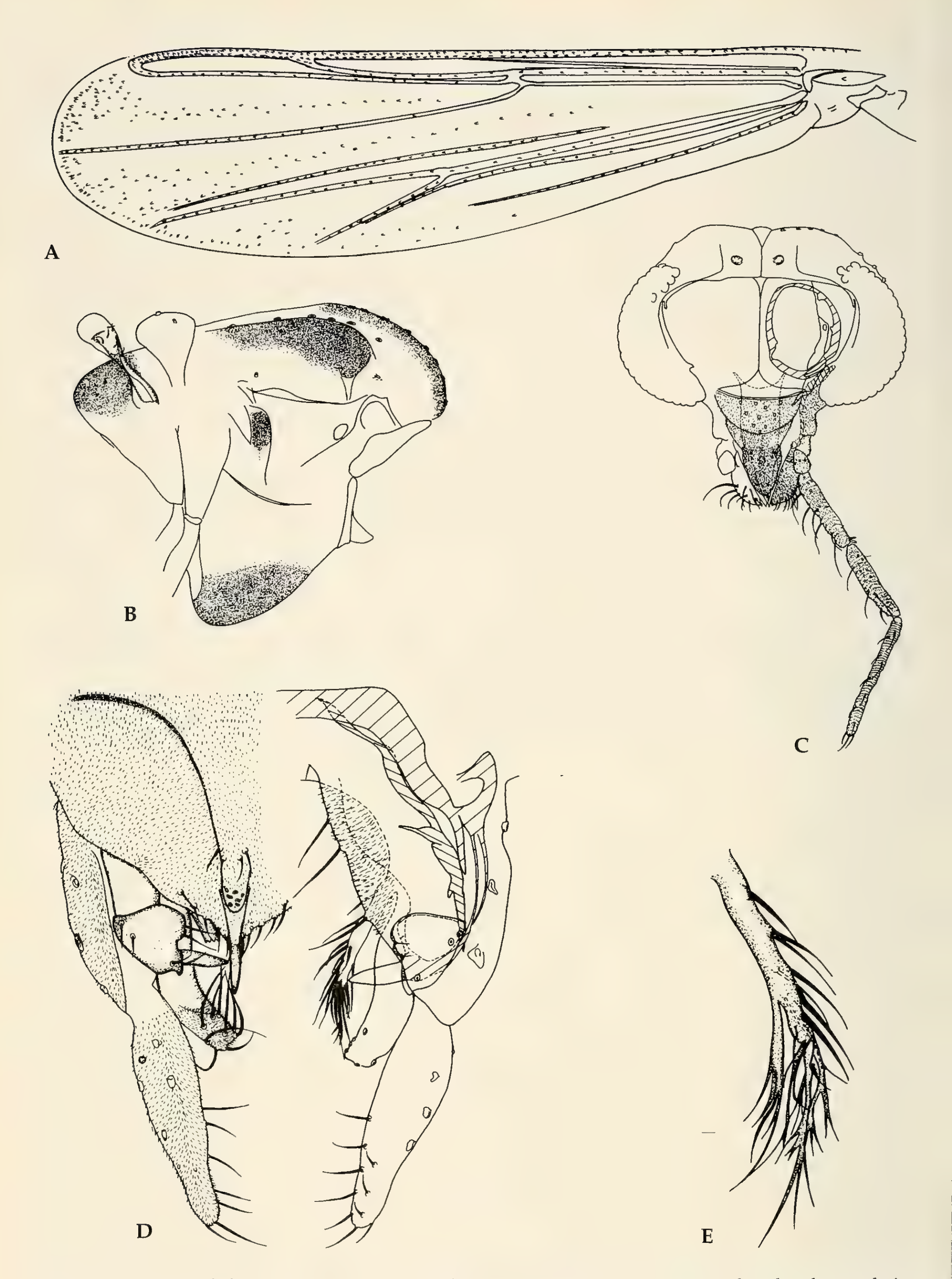


Fig. 4. *Tanytarsus spiesi*, spec. nov. **A.** Wing. **B.** Thorax. **C.** Head. **D.** Hypopygium dorsal and ventral view. **E.** Median volsella.

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	452	207	–	–	–	–	–
p_2	452	384	242	103	64	39	32
p_3	443	488	336	203	174	100	55

	LR	BV	SV	BR
p_1	–	–	–	–
p_2	0.63	4.51	3.45	–
p_3	0.69	2.38	2.74	6.8

Hypopygium (Fig. 4D). Tergite IX 66 µm long with 4 median and 12 apical setae. Anal point relatively long and slender, 35 µm long, 10 µm wide at base, 2 µm wide at apex. Anal point with 7 spines between weak anal crests. Anal tergite bands separated, curved anally, connecting with anal crests. Transverse sternapodeme 49 µm long, phallapodeme 80 µm long. Gonocoxite 82 µm long. Gonostylus 68 µm long with about 7 median directed setae. Superior volsella somewhat heart-shaped, bearing 3 setae dorsally and 3 setae apically. Digitus long, extending far beyond apex of superior volsella. Median volsella (Fig. 4E) with about 10 simple, median directed lamellae, 56 µm long including three 29 µm long branched lamellae. Inferior volsella medially bent, 49 µm long, with about 9 strong setae directed both orally and anally. HR 1.21, HV 2.51.

Systematic position. *T. spiesi* keys out to the *eminulus*-group if the criteria of spines in one longitudinal row is ignored, but like the case of *T. saetheri*, there are no morphological very similar species in the group.

Tanytarsus superpenicillatus, spec. nov.

Fig. 5

Type material. Holotype: ♂, Ghana, Eastern Region, Boti Waterfalls, Malaise trap, 4.XI.1994. – Paratypes: 2♂♂, Ghana, Eastern Region, Kibi, Subri Stream, Light trap, XI.1993 & 4.II.1993; 1♂, Tanzania, Tanga Region, West Usambara Mt., Mazumbai, Kaputu, Malaise trap, XI.1990. All type material in Museum of Zoology, Bergen, Norway (ZMBN Type No. 308).

Etymology. *superpenicillatus* from Latin, meaning "larger brush" referring to the extremely long lamellae on median volsella.

Diagnosis. *Tanytarsus superpenicillatus*, spec. nov. is separable from other *Tanytarsus* species by the following combination of characters: Large species about 2.5 mm long; AR about 0.70; LR about 3,0; large cephalic tubercles; thorax with brown patches on antepronotum, scutum and postnotum; hypopygium: Spines in one row between well developed anal crests, superior volsella somewhat pear-shaped with dorsolateral microtrichia and 3 median setae; digitus delicate and often hard to recognise; median volsella extremely long with lamellae extending as far as apex of gonostyli.

Description

Male imago (n=4).

Total length 2.35-2.89 mm. Wing length 1.23-1.51 mm. Total length/wing length 1.81-1.93.

Coloration. Cleared specimens with head light yellowish, dark reddish brown antennae and eyes; thorax with brown antepronotum and brown patches on postnotum, dorsally and laterally on scutum; legs with darker apexes of femur and tibia; wings transparent with two small brown patches on squama and almost black arculus; abdomen light greenish with darker bands on anterior parts of tergites VI and VII and posterior on tergite VII, apodemes in hypopygium brown.

Head (Fig. 5C). AR 0.64-0.72. Thirteenth flagellomere 329-352 µm long. Longest antennal seta about 485-550 µm long. Eyes with strong dorsomedian elongation, distance between eyes 94-126 µm. Temporal setae 8-9; 3 inner verticals, 2-3 outer verticals, 3-4 postorbitals. Clypeus 74-84 µm long with 13-17 setae. Tentorium 100-113 µm long, 26-29 µm wide at sieve plate. Stipes 113-123 µm long and 6-9 µm wide. Cibarial pump 45-55 µm wide with 2 small sensorial setae ventrolaterally on each side. Lengths

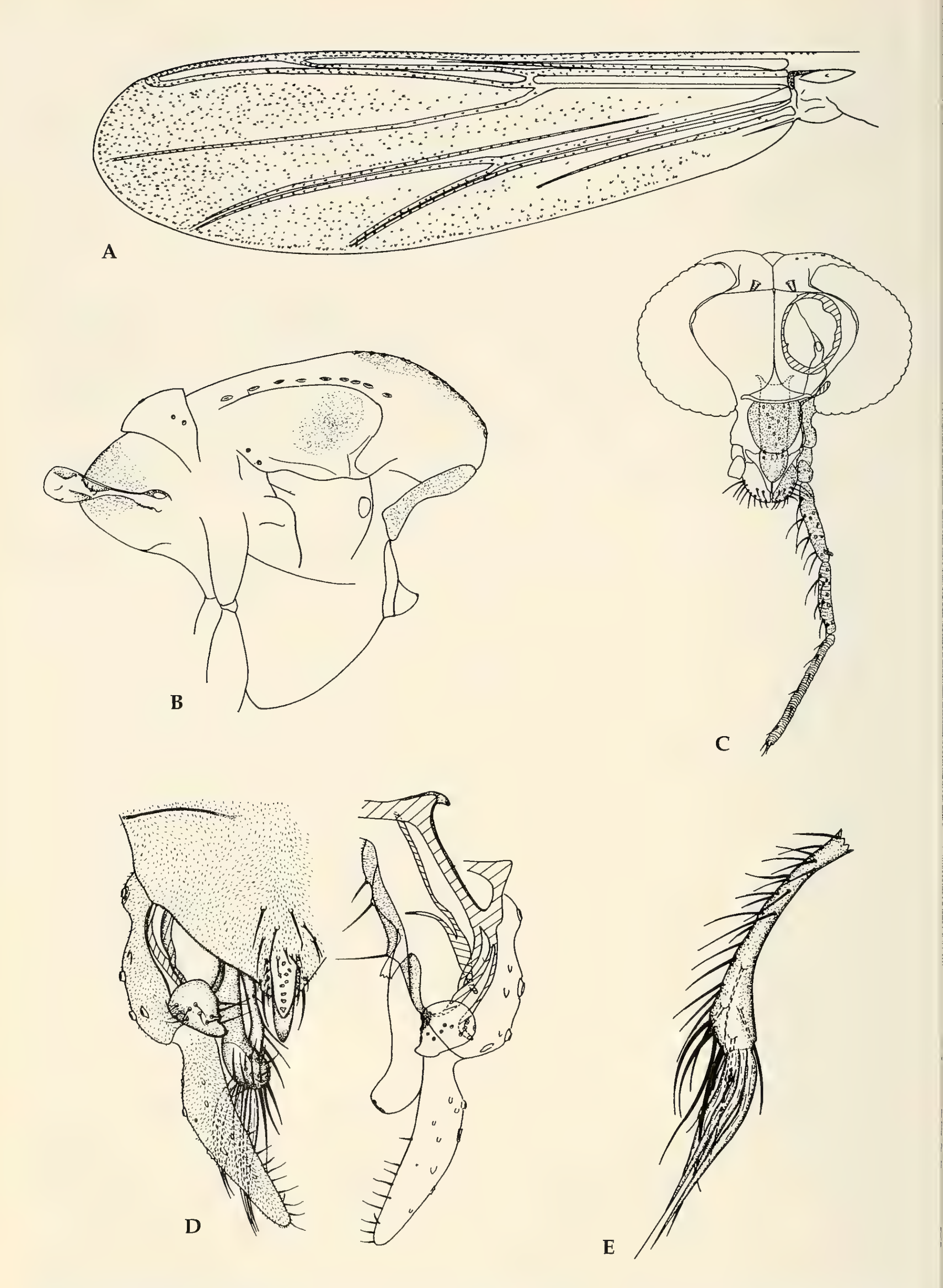


Fig. 5. *Tanytarsus superpenicillatus*, spec. nov. **A.** Wing. **B.** Thorax. **C.** Head. **D.** Hypopygium dorsal and ventral. **E.** Median volsella.

of palp segments (in µm): 26-32, 26-32, 100-123, 103-113, 184-207.

Thorax (Fig. 5B). Dorsocentrals 8-10, acrostichals 15-19, prealars 2-3. Scutellum with 6-8 setae. 6-12 setae on halteres.

Wing (Fig. 5A). VR 1.23-1.27. Setation: Brachiolum 1 seta, Sc with 15-36 setae, R with 28-37, R_1 with 38-44, R_{4+5} with 53-72, M and RM bare, M_{1+2} with 48-70, M_{3+4} with 32-35, Cu with 23-29, Cu_1 with 20-24, PCu with 23-60 and An with 28-39 setae. Cells: m bare, r_{4+5} with more than 200 setae, m_{1+2} with more than 250 including false vein, m_{3+4} with more than 150, cu and an combined with about 150-200 setae.

Legs. Hind tibia with more setae towards apex. Spur on front tibia 36-42 µm long. Spurs of middle tibia 36-39 µm long including 16-23 µm long comb and 26-29 µm long including 16-23 µm long comb; of hind tibia 45-48 µm including 19-23 µm comb and 32-42 µm long including 16-19 µm long comb. Lengths (in µm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	662-782	300-378	904-969	443-468	349-388	300-333	126-132
p_2	617-720	497-598	323-336	145-149	94-100	48- 58	36- 39
p_3	630-775	630-743	433-468	258-268	229-242	132-152	64- 71

	LR	BV	SV	BR
p_1	2.97-3.16	1.51-1.56	1.02-1.06	2.8-4.0
p_2	0.64-0.65	4.22-4.54	3.43-3.50	4.0-6.7
p_3	0.67-0.72	2.43-2.51	2.80-2.92	5.0-6.9

Hypopygium (Fig. 5D). Tergite IX 103-121 µm long with 7-11 median and 16-24 apical setae. Anal point 37-62 µm long, 12-18 µm wide at base, 5-8 µm wide at apex. Well developed anal crests. Anal point with 8-20 robust spines in between. Anal tergite bands almost straight, transverse, but not connecting with each other. Transverse sternapodeme 51-68 µm long, phallapodeme 94-115 µm long. Gonocoxite 85-133 µm long. Gonostylus 85-117 µm long with about 10 median directed setae. Superior volsella pear shaped, bearing 8-10 small setae dorsally and 3 setae medially; dorsolateral field of microtrichia present. Digitus short and delicate. Median volsella (Fig. 5E) bearing 17-20 median and 12-15 apical setose lamellae in addition to 4-7 extremely long, 132-152 µm, and about four 62-82 µm long, broad lamellae. Inferior volsella somewhat club-shaped, 64-92 µm long, with about 12 strong setae directed orally and about 5 strong setae directed anally. HR 1.04-1.14, HV 2.18-2.85.

Systematic position. *T. superpenicillatus* keys out to the *lugens*-group in the key to European *Tanytarsus* species (Reiss & Fittkau 1971). The new species separates from the other European species in the group especially by the extremely long median volsella.

Tanytarsus tossai, spec. nov.

Fig. 6

Type material. Holotype: ♂ Ghana: Western Region, Ankasa Game Production Reserve, Malaise trap, 6-12.XII.1993. – 3 paratypes: 1♂, as holotype; 1♂, as holotype but collected in Light trap; 1♂ Ghana: Volta Region, Wli, Agumatsa Waterfalls, Light trap, 17-20.XI.1993. All type material is deposited at Museum of Zoology, Bergen, Norway (ZMBN Type No. 309).

Etymology. The species is named after my very good friend Tor Helge ("tossa") Opdahl for his support during my work on this matrial.

Diagnosis. The male imagines are separable from other *Tanytarsus* species by having the following combination of characters on the hypopygium: Anal point with a swollen apex, and a single row of spines between anal crests, somewhat elongate superior volsella tapered with widest width on the median margin, long dorsolateral field of microtrichia along the posteriolateral margin, narrow digitus only reaching beyond the superior volsella at the very tip, median volsella about 20 µm long with about 12 anally bent lamellae of variable length, inferior volsella straight, with long medially directed microtrichia placed on the distal ½.

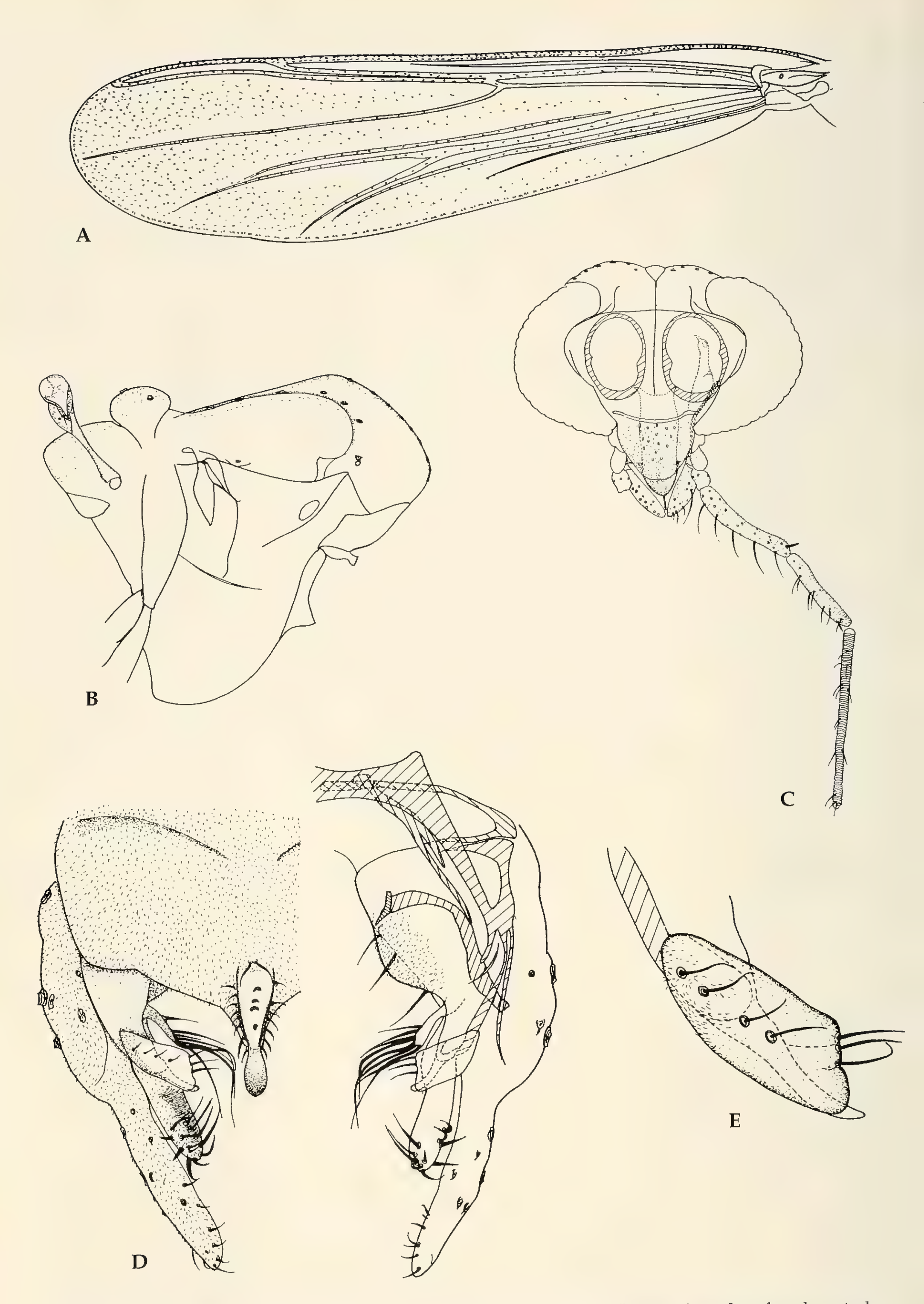


Fig. 6. *Tanytarsus tossai,* spec. nov. **A.** Wing. **B.** Thorax. **C.** Head. **D.** Hypopygium dorsal and ventral.

Description

Male imago (n=4).

Total length 2.41-2.60 mm. Wing length 1.35-1.39 mm. Total length/wing length 1.77-2.03.

Coloration. Cleared specimens with light yellow head, brown antennae, dark brown eyes; light yellow thorax without special markings, light brown legs, wings transparent with somewhat brownish veins; abdomen, hypopygium light yellowish.

Head (Fig. 6C). AR 0.97-1.03. Thirteenth flagellomere 452-462 µm long. Longest antennal seta 497-502 µm. Temporal setae 8-9; 4 inner verticals, 3 outer verticals, 1-2 postorbitals. Clypeus 77-88 µm long, with 11-15 setae. Tentorium 77-121 µm long, 26-33 wide at sieve plate. Stipes 114-146 µm long, 7-11 µm wide. Lengths of palp segments (in µm): 26-37, 29, 128-158, 110-146, 194-249. Frontal tubercles barely recognisable sitting on frontal suture.

Thorax (Fig. 6B). Dorsocentrals 7-9, acrostichals 11-15, prealars 1. Scutellum with 4 setae. Halteres with 6 small setae.

Wing (Fig. 6A). VR 1.19-1.27. Brachiolum with 1 seta, Sc bare, R with 22-30 setae, R_1 with 22-31, R_{3+4} with 47-52, M_{1+2} with 45-64, M_{3+4} with 29-31, Cu with 16-28, Cu_1 with 17-21, PCu with 32-44 and An with 21-25 setae. Cells r_{4+5} with about 170-280 setae, m_{1+2} with about 175-260 including false vein, m_{3+4} with 90-110, cu with 69-92 and an with 40-58 setae, occasionally both vein M and cell m with 1 seta.

Legs. Spurs of front tibia 18-37 µm long. Spurs of mid tibia 32-45 µm long including 15-23 µm long comb and 26-45 µm long including 16-18 µm long comb; of hind tibia 36-44 µm long including 16-18 µm long comb and 29-40 µm long including 15-18 µm long comb. Lengths (in µm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	682-748	282-330	1125-1173	483-491	403-414	330-337	139-180
p_2	620-698	488-665	365-378	142-161	81-126	52- 58	37- 45
p_3	652-704	539-697	474-528	286-312	260-282	145-158	66- 71

	LR	BV	SV	BR
p_1	3.41-3.90	1.52-1.62	0.84-0.96	2.6-3.8
p_2	0.56-0.75	4.33-4.77	2.99-3.67	4.6-7.2
p_4	0.71-0.93	2.17-2.44	2.47-2.86	3.8-6.4

Hypopygium (Fig. 6D). Tergite IX with 2-6 median, 12-20 apical setae. Anal point 37-44 µm long, 14-28 µm wide at base, 5-9 µm wide at the swollen apex, 2-6 spurs between well developed anal crests. Phallapodeme 106-140 µm long, transverse sternapodeme 58-76 µm long. Gonocoxite 110-120 µm long, gonostylus 69-81 µm long. Superior volsella bearing 4 small dorsal setae, 3 stronger subapical setae and a long, dorsolateral field of microtrichia. Median volsella 32 µm long with about 12 strong and anally bent lamellae, longest lamella 27-34 µm long. Inferior volsella 74-80 µm long with straight distal ½ figuring long medially directed microtrichia and about 13 strong apical setae. HR 1.37-1.67, HV 3.21-3.59.

Systematic position. The morphologically closest group of *T. tossai* is probably the *mendax*-group and ignoring "Appendage 1 elongated, and strongly narrowed towards end." and "The distally parallel, separated bands on the anal tergite reach to the paired anal comb" in the key to European *Tanytarsus* (Reiss & Fittkau 1971), will place the new species in this group. (*holochlorus*-group (Reiss & Fittkau 1971) = *mendax*-group (Cranston et al. 1989).

Discussion

In the key to male imagines of Chironominae (Cranston et al. 1989), all of the above described species key out to *Tanytarsus*. The large morphological variation between these species reflects the well known interspecific variation in *Tanytarsus* as a whole. An attempt to place the new species into the already existing European species-group concept has been made, but as shown, all but one species fail to be

placed without ignoring one or more diagnostic characters. The now existing European species-groups based on adult morphology therefore, do not work for Afrotropical *Tanytarsus* species.

A division of the worlds *Tanytarsus* into subgenera or species-groups might have to await a thorough revision of the genus including more descriptions of associated material, or at least redescriptions of already described species.

Acknowledgements

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Chromosomes, morphology, ecology and distribution of *Sergentia baueri*, spec. nov., *S. prima* Proviz & Proviz, 1997 and *S. coracina* Zett.,1824

(Insecta, Diptera, Chironomidae).

W. Wülker, I. I. Kiknadze, I. E. Kerkis and **P. Nevers**

Wülker, W., I. I. Kiknadze, I. E. Kerkis & P. Nevers (1999): Chromosomes, morphology, ecology and distribution of *Sergentia baueri*, spec. nov., *S. prima* Proviz & Proviz, 1997 and *S. coracina* Zett., 1824 (Insecta, Diptera, Chironomidae). – Spixiana **22/1:** 69-81

1. As proposed earlier *Sergentia longiventris* Kieffer is a junior synonym for *S. coracina*. Therefore the *Sergentia* material from the Black Forest, Alps (Lunzer Mittersee) and Far East represents a new species (2n=8), *S. baueri*. The Fennoscandian *Sergentia* with 2n=8 belongs to the species *S. prima* recently described in reservoir lakes of the Baikal area in Siberia.

2. The karyotype of these two species as well as that of *S. coracina* (2n=6) has been investigated.

3. Some morphological data for the species and keys for analysis of chromosomes, larvae, pupae and male adults are provided.

4. *Sergentia baueri* only occurs in small, considerably eutrophied pools. *S. prima* prefers (in Scandinavia) shallow humous to polyhumous lakes, while *S. coracina* prefers deep, sometimes ultraoligotrophic lakes. Nevertheless joint occurrence of *S. prima* and *S. coracina* is observed in Norvegian lakes. *S. prima* and *S. baueri* coexist in the Irkutsk reservoir in Siberia.

5. *Sergentia baueri* extends from West Germany to the Far East of Russia; *S. prima* has been described from Siberia and Fennoscandia; *S. coracina* is holarctic.

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Introduction

The genus *Sergentia* is important as an indicator of "mesotrophic" conditions in freshwater lakes (Lenz 1925,1927). Two species in particular are well known in Europe: *S. Coracina* Zetterstedt is an apparently cold stenothermic but euryoxybiontic species that inhabits fairly deep lakes. It occurs not only in Europe (for a summary of data see Brundin 1949) but also in the USA and Canada (Johannsen 1934, Townes 1945, Stahl 1959, 1966). *S. "longiventris"* Kieffer was assumed to be present not only in Fennoscandia (Brundin 1949) but also in the Alps (Brehm 1942, Thienemann 1943, Bauer 1945), the Black Forest of Germany (Lundbeck 1951, Wülker 1961, Nevers 1972), and the USSR (Tschernovskij 1949, Linevich 1981, Proviz et al. 1991, Kiknadze et al.1991, and unpublished data of I. Kerkis and E.

A. Makarchenko). The validity of the species name *"longiventris"*, however, is doubtful. Some investigations indicate that *S. longiventris* may be a younger synonym of *S. coracina*. Wülker (1961) observed that the original material of this species resembles *S. coracina* in pupal morphology. Hofmann (1971) stated that the premandibles of larvae in Fennoscandian material had 2 teeth like *coracina* rather than 4 teeth like *"longiventris"* from the Alps and Black Forest. Therefore he declared *longiventris* and *coracina* to be synonyms. O. A. Schnell (pers.comm.) is convinced that Kieffers specimen of *"longiventris"* from the locus typicus Nedre Sjodalsvatnet in Norway must have been *coracina*. He has found only male adults with antennal ratios of about 4 in this lake. Both *longiventris* and *coracina* are said to have an A. R. of 4 (Goetghebuer in Lindner 1937-54). Brundin (1949) was of the opinion that *S. coracina* and *S. longiventris* can occur sympatrically in the litoral of Fennoscandian lakes. But his *"longiventris"* males had an A. R. of 2.5 (mean) (Berg & Petersen 1956) – much different from the *longiventris* description. *S. "psiloptera"* from Bear Island, described by Edwards (1935), may also not be a valid species. O. A. Schnell (pers.comm.) recently investigated two males in the Museum of Stockholm and found them to belong to the genus *Stictochironomus*. Nevertheless, another large *Sergentia* species (other than *S. coracina*), *S. "psiloptera"* as described by Brundin 1949 and Wülker 1961, may be present at greater northern latitudes.

Outside Europe, the radiation of *Sergentia*-species in the surroundings of Lake Baikal (Proviz et al. 1991) and in the lake itself (Proviz and Proviz 1992, Proviz et al. 1994) and the American species *S. albescens* (Townes 1945) may be mentioned.

On the basis of the pioneering investigations of Bauer (1945), Wülker (1961) relied on the help of chromosome investigations for elucidating the confusing situation of the *Sergentia* nomenclature. This approach proved to be useful. Nevers (1972) found two *Sergentia* species in the Black Forest (Germany), one with 3 chromosomes (*S. coracina*), the other with 4 chromosomes and identical to that described by Bauer in the Lunzer Mittersee. I. E. Kerkis (Novosibirsk) received material for chromosome investigation from Frotveitvatnet near Bergen/Norway (thanks to O. A. Schnell and J. Harvardstun) which also contained (pers.comm.) two different species with 3 (*S. coracina*) and 4 chromosomes. But the latter was not the same as that investigated by Nevers. It belongs to a species recently described in Siberia, *S. prima* Proviz & Proviz 1997 (= *S.* spec. N1 Proviz et al. 1991). In contrast, larvae from the Far East collected by E. A. Makarchenko were similar to the second Black Forest species.

In consequence, if the original *longiventris* is synonymous to *S. coracina* and the northern European *"longiventris"* is *S. prima*, the 4-chromosome-species in Germany, Austria and Far East must be regarded as new. In the present paper we provide the basic data for this new concept and describe the ecology and distribution of the three taxa in question. In subsequent papers data about inversion polymorphism will be discussed. The fourth European *Sergentia* taxon (see above) could not yet be characterized by chromosome analysis.

Materials and methods

The following materials were available for karyotype analysis:

1. *Sergentia baueri*, spec. nov. (*S. longiventris* sensu Bauer 1945, Wülker 1961, Nevers 1972, Kiknadze et al. 1991, Proviz et al. 1991).

Germany: Pool near Hydrobiological Station Falkau/Black Forest ("Feuerlöschteich"), ca. 900m a.s.l., in mud or on *Callitriche*, 30.VI.61, 28 chromosome squashes (chrom. squ.), P. Nevers; pool at "Hinteres Schafhäusle" near St. Peter/Black Forest, ca.720 m a.s.l., nearly stagnant water, deep mud, fairly eutrophied, *Sergentia* very abundant, 1971, 56 chrom. squ., P. Nevers; forest pool near St. Märgen/ Black Forest, ca.920m a.s.l., sandy bottom with thin layer of mud, considerable current, small *Sergentia* population, 28 chrom. squ., 1971, P. Nevers; 1 female adult, 10 pupal skins, 10 larvae, 1996, W. Wülker.

Russia: Far East: Lake Teploe, Chabarovsk region, 15.V.89 and 23.V.89, 7 larvae, 10 prepupae, E. A. Makarchenko.

We saw chromosomes of the Siberian *"S. longiventris"* during a visit of Dr. V. Proviz in Germany in 1995. Two rearings (larva, pupal skin, male adult) from the Irkutsk reservoir were sent 1996.

2. *Sergentia prima* Proviz & Proviz 1997 (*"longiventris"* sensu Brundin 1949, Berg & Petersen 1956).
Norway:Frotveitvatnet, 1.VI.90, 7 chrom. squ.; VIII.94, 33 chrom. squ., O. A. Schnell.

Sweden: Smaland, Grimsgöl, NO of Vaxjö (county Gardsby), extremely polyhumous lake, max. depth 4.8 m (see Brundin 1949, 360-384), 8.V.80, 1 chrom. squ. with larval body, W. Wülker.

Denmark: North Sealand, Gribsø (55°59'N, 12°16'E), humic lake, 50 m a.s.l., max. depth 11m, 20.VII.61, 1 chrom. squ., I. C. Petersen. 2 pupal exuviae, sent by C. Lindegaard 1996; 28.4.1997 25 pupal exuviae, 6 male adults, 5 female adults, C. Lindegaard. We saw chromosome photographs of *S. prima* from Siberia thanks to Dr. V. Proviz.

3. *Sergentia coracina* Zetterstedt.
Germany: Titisee/Black Forest, 845 m above sea level (a.s.l.), (see Lundbeck 1951), max. depth 39.5 m, maximal abundance of *Sergentia* 15 m, 6.IV.61, 15 chrom. squ., W. Wülker; 20.IV.1996, 60 male adults, 7 female adults, W. Wülker and R. Rössler; Feldsee/Black Forest, 1109 m a.s.l., max. depth 34 m, max. abundance *Sergentia* 20-28 m, 21.IV.60, 9 chrom. squ., W. Wülker.

Switzerland: Vierwaldstätter See, ca.200-500 m N of Hydrobiological Institute Kastanienbaum (ETH Zürich), from ca. 20 m depth, 24.III.71, 66 chrom. squ., P. Nevers.

Finland: Hietajärvi, 2 chrom. squ., E. Koskenniemi.

Norway: Frotveitvatnet (slightly polyhumous lake, 266 m a.s.l., 1.VI.90, 4 chrom. squ.,VIII.93, 13 chrom. squ., O. A. Schnell; Askjelldalsvatn, (ultra)oligotrophic lake, 810 m a.s.l., Secchi-disk depth 10-12 m, 31.VII.90, 4 chrom. squ., 30.VII.91, 17 chrom. squ., O. A. Schnell; Grondalsvatnet (oligotrophic lake), VIII.93, 4 chrom. squ.,O. A. Schnell.

USA: Indiana, Angola County, Crooked Lake, 41°16'N, 85°29'W, from 20 m depth, 34 chrom. squ., P. Nevers; Wisconsin, Green Lake, 43°50'N,89°2'W, at a place where the bay of Green Lake village meets with the main lake, from 20 m depth, 18 chrom. squ., P. Nevers.

Specimens were fixed with a fresh mixture of 96 % ethanol and glacial acetic acid (3:1). The squash technique was routine (Keyl & Keyl 1959). Phase contrast was used to analyze the puffing pattern, particularly the nucleoli and Balbiani ring positions. Metaphase chromosomes were studied in spermatogonial mitosis in prepupae.

The terminology of larval structures follows Pinder & Reiss 1983 and Saether 1980.

Results

Sergentia baueri, spec. nov.

Bauer 1945, *Sergentia longiventris*, chromosomes.
?Tschernovskij 1949, *Sergentia* group *longiventris*, larva.
Wülker et al. 1969, *Sergentia longiventris*, hemolymph proteins.
Nevers 1972, *Sergentia longiventris*, chromosomes, male adult (drawing hypopygium).
Kiknadze et al. 1991, *Sergentia longiventris*, chromosomes, description of larva (both of Far East population).
Proviz et al. 1991, *Sergentia longiventris*, chromosomes, hemolymph proteins.

We dedicate this species to Prof.Dr. Hans Bauer/Tübingen in recognition of his valuable contributions to the cytotaxonomic knowledge of chironomid midges. We have chosen to use its banding pattern as a standard.

Holotype: Chromosome preparation SH B17, leg.P. Nevers, pool at Schafhäusle near St. Peter/Black Forest, ca.720 m a.s.l., in Zoologische Staatssammlung München. – Paratypes: chromosome preaparation SH B18; adult male Nr.13, Schafhäusle near St. Peter, leg.P. Nevers, in Zoologische Staatssammlung München; 1 adult female, 5 pupal skins, 5 larval heads, forest pool near St. Märgen/Black Forest, leg. W. Wülker, in Sammlung Wülker.

Karyotype (Fig. 1), description, if not otherwise stated, based on the monomorphic West European population.

2n=8; three pairs of long chromosomes and a pair of short chromosomes are observed in metaphase (Fig. 1a). There are four polytene chromosomes in salivary gland cells. Chromosomes I and II are metacentric, chromosome III is a real submetacentric, and chromosome IV is acrocentric (telocentric)

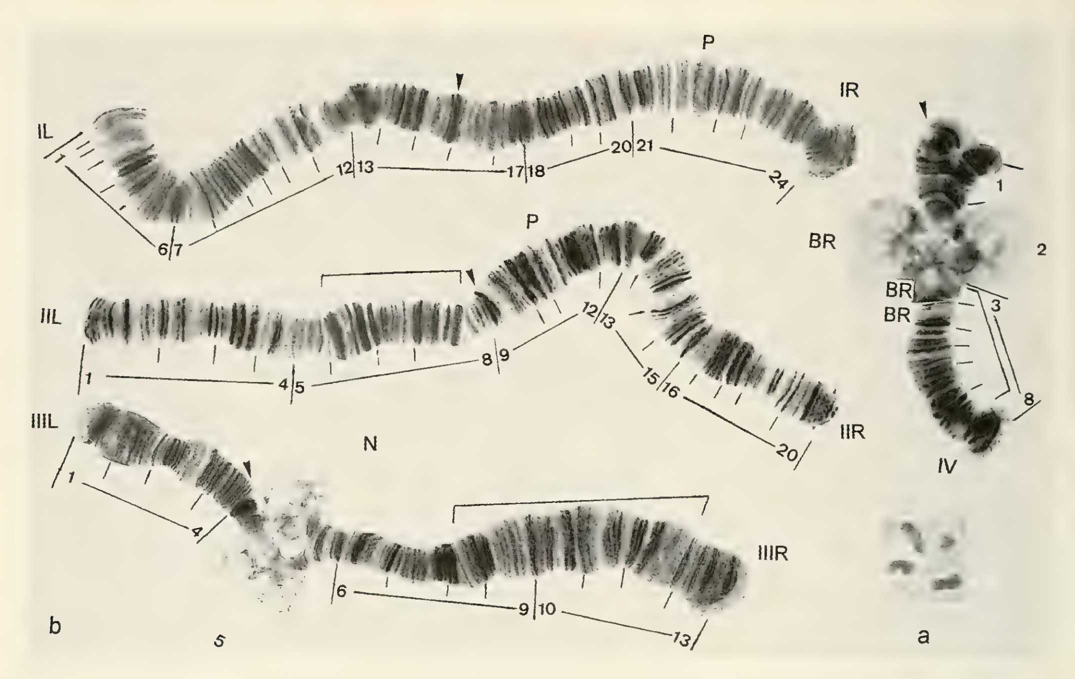


Fig. 1. Chromosomes of *Sergentia baueri*, European population. **a.** Mitosis figure (spermatogonia). **b.** Salivary gland chromosomes. **N:** nucleolus, **P:** puff, **BR:** Balbiani ring, arrow heads: centromeres or telomeres.

(Fig. 1b). The chromosomal length relationships are I=II>III>IV. The centromeric bands are only slightly heterochromatinized. It is important to note that the polytene level of chromosome IV is two times less than that of the other chromosomes of the complement. This phenomenon is a special feature of the genus *Sergentia*. A nucleolus is localized in chromosome III (arm IIIR); Balbiani rings can be found in chromosome IV.

Inversion polymorphism is prevalent only in Siberia and the Far East populations (arms IIL,IIIR and IV, brackets in Fig. 1). The inversions in IIL and IIIR were fixed in the Far East populations.

Chromosome I can be identified by the constriction in region 24 and a specific puff in region 22 of arm IR.

Chromosome II is characterized by a constriction in region 19 and by a series of thick bands in regions 17-18 of IIR, as well as region 6 in arm IIL. A large puff is developed in region 11 (IIR) in 35 % of the investigated specimens. According to Nevers (1971) the Balbiani ring is open at this site.

Chromosome III has a nucleolus in arm R (region 5). It is located near the centromeric band (Fig. 1).

Chromosome IV has several Balbiani rings (BRs). BR1 is usually well developed in all larvae. It starts to become inactivated in some salivary gland cells in prepupae. BR2 and BR3 are less frequently found in an active state. Different combinations of the active states of these BRs have been observed. A BR-like structure was sometimes found at the very end of chromosome IV (Fig. 1).

Larva (based on Kiknadze et al. 1991, p. 28 and plate 43). Length IV.instar 10.5-12 mm, red. Lateral and ventral tubuli absent. Head width 0.42-0.53 µm, yellow, but frontoclypeus , surrounding area and gula brown (Fig. 3a). Eye spots not connected. Antenna with 5 segments; second segment with Lauterborn organs. Length of segments 1-5 (in µm) 98:28:14:14:6. Antennal blade extends to base or tip of segment 5. Ring organ in basal third of basal segment, R=25µm. Width segment 1 at ring organ 28 µm. A.R.=1.6. Premandible with 4 teeth (Figs. Wülker 1961, Kiknadze et al. 1991) and extended brush. Pecten epipharyngis (Fig. 3b) tripartite as in other species; fig. 43 in Kiknadze et al. 1991 must be out of focus. Mandible yellow brown in lower ⅔, distally brown or even dark brownish. 5 inner teeth, the apical one larger but others of equal length, distal tooth short. Seta subdentalis long, slightly curved, sometimes serrated. Inner bristles (setae internae) split in 5-10 dichotomous parts. Mentum with 4 middle and 6

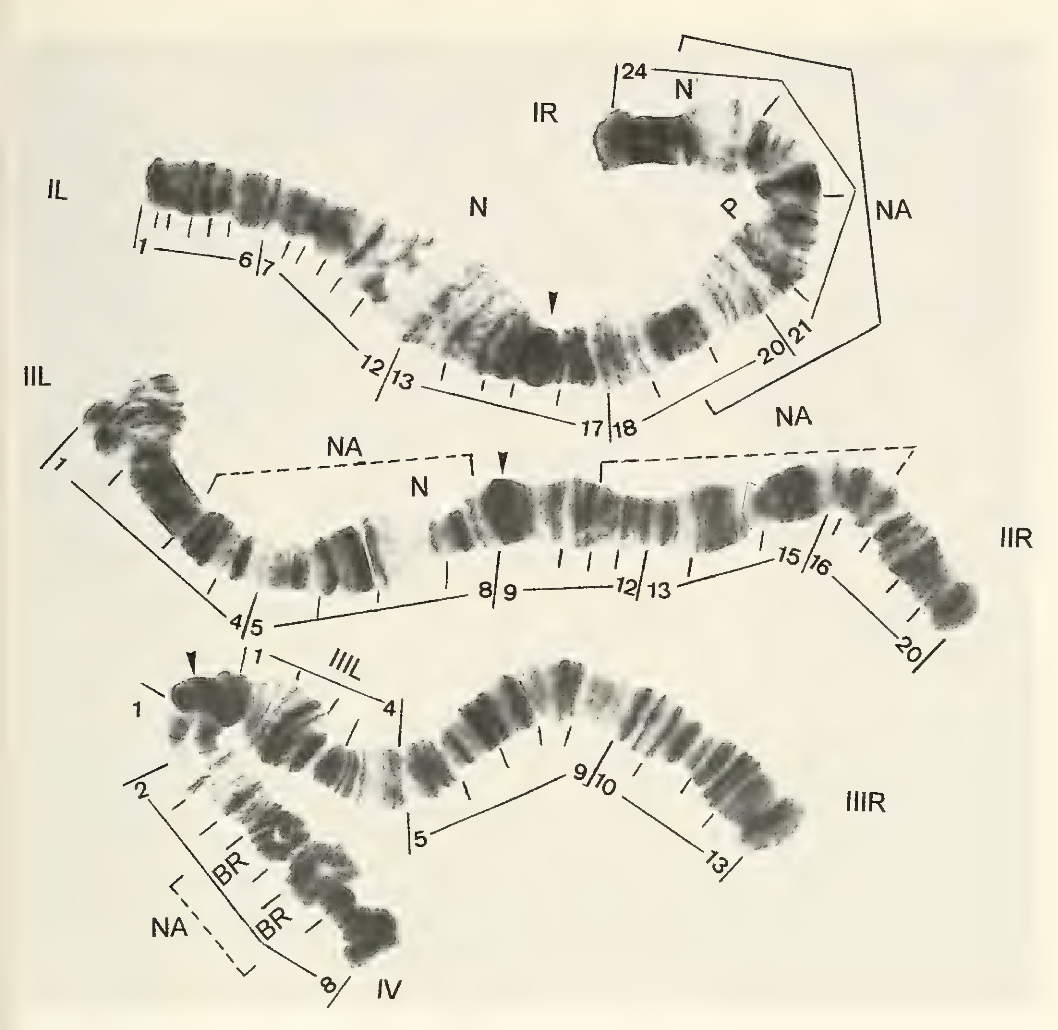


Fig. 2. Chromosomes of *Sergentia coracina*, Vierwaldstätter See. Brackets with solid lines: fixed inversions, brackets with interrupted lines: floating inversions.

pairs of lateral teeth, colour dark brown. The two inner middle teeth a bit lower than the outer medians and of approximately equal width. Lateral teeth set along one straight line. Ventromental plates about the same width as mentum, slightly curved. The striae have a terminal part with straight edges and a more posterior part disappearing in distal area. Connections between both parts barely visible (Fig. 3c). In fig. 43A Kiknadze et al.1991 the ventromental plates seem incorrect.

Pupa (Langton, pers.comm). Anterior and median points of tergites III and IV of similar size (this character is best observed under low power). Anterior band points vary gradually in size to the median points producing the effect of a wide but indistinct band broadly joined to the median patch. Darker exuviae with golden to brown combs on segment VIII. Length 5.6-9.8 mm (m=7.4, n=25). 28-63 anal lobe taeniae (m=49.6, n=25).

Adult male (Fig. 4a). Clearly smaller than *S. coracina*, slightly bigger than *S. prima* (Tab. 1) Diagnostic characters are the low A. R., the long and narrow, more or less parallelsided anal point, the angulate end of the gonostylus.

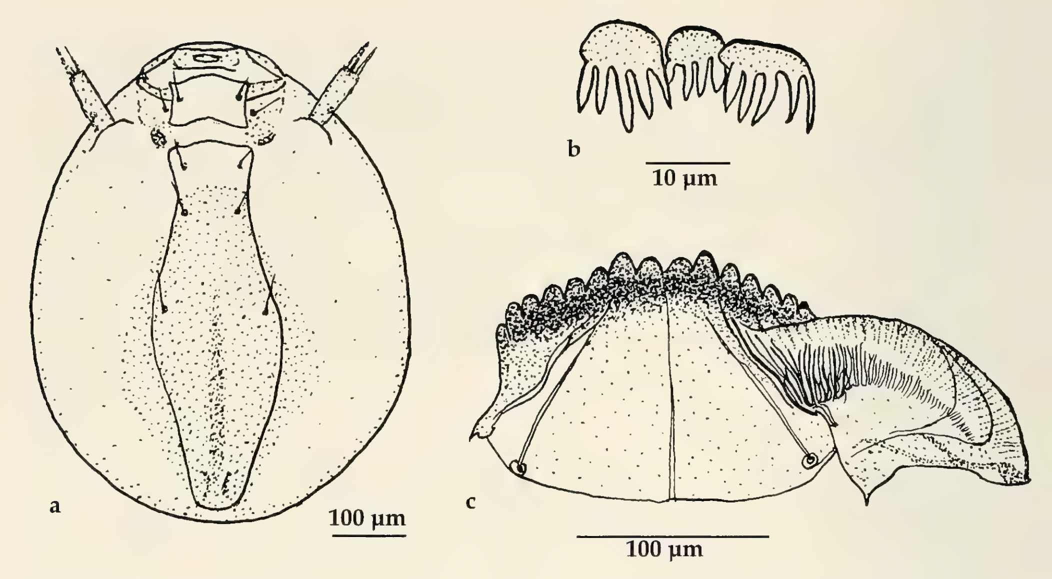


Fig. 3. *Sergentia baueri.* a. Head of larva, dorsal view. b. Pecten epipharyngis. **c.** Ventromental plates, drawing V. Proviz (unpublished).

Adult female (Fig. 5) n=1 (freshly emerged). Head: Length antennal flagellomeres 80:103:130: 130:124:252 µm. Frontal tubercles absent. Ocular ratio= 0.35. Temporal setae ca. 25. Thorax: Dorsocentral setae 39,36, acrostichal setae 21. Wing membrane with setae, squama setae about 30. Front tibia of legs with rounded scale, middle tibia with 1 spine, hind tibia with 2 spines. Sensilla chaetica hind leg in 2-3 rows, more than 100. Abdomen: Genitalia: Gonocoxapodeme VIII without clear branch on base of dorsomesal lobe, gonapophysis VIII: dorsomesal lobe large, apodeme lobe sigmoid, ventrolateral lobe brushlike as usual. On both sides of labia an additional bowlike sclerite. Endoskeleton of typical form (Fig. 5). Coxosternapodeme light (but very young individal). Gonocoxite IX with 3 bristles. Postgenital plate triangular. Spermathecal ducts nearly straight.

Sergentia prima Proviz & Proviz 1997.

Brundin 1949, *Sergentia longiventris*, distribution, ecology.
Berg & Petersen 1956, *Sergentia longiventris*, larva, adult male, female.
Wülker 1961, *Sergentia longiventris* "Brundin material", larva, pupa.
Proviz et al. 1991, *Sergentia* spec. N1, karyotype, hemolyph proteins.
Proviz & Proviz 1997, *Sergentia prima*, original description, karyotype, larva.

Karyotype. 2n=8, Centromeres heterochromatinized. Nucleoli in IL and in IIR. Inversion polymorphism in chromosome arms IR, IIIL, IV.

Chromosome I : Typical puff in group 22 of *S. baueri* is located in distal position (group 19), but band groups in the middle part inverted and areas near the centromere exchanged (complex inversion). Arm IL more or less identical with that of *S. coracina*, nucleolus also in same position.

Chromosome II: in arm IIR a constriction beyond the distal third (group 21 in *S. baueri* and 20 in *S. prima*). A nucleolus can be found close to the centromere. In arm IIL, the typical dark groups (identical with group 6 in *S. baueri*) are not far from the centromere (group 11 in *S. prima*).

Chromosome III: In IIIR the typical groups 5-6 are next to the centromere but apparently in inverted position. Terminal end fan shaped with 4 characteristic dark band groups.
IIIL is also fan shaped when homozygous but with mostly light bands. Both banding patterns differ by a very long inversion and are thus fully separated in heterozygotes.

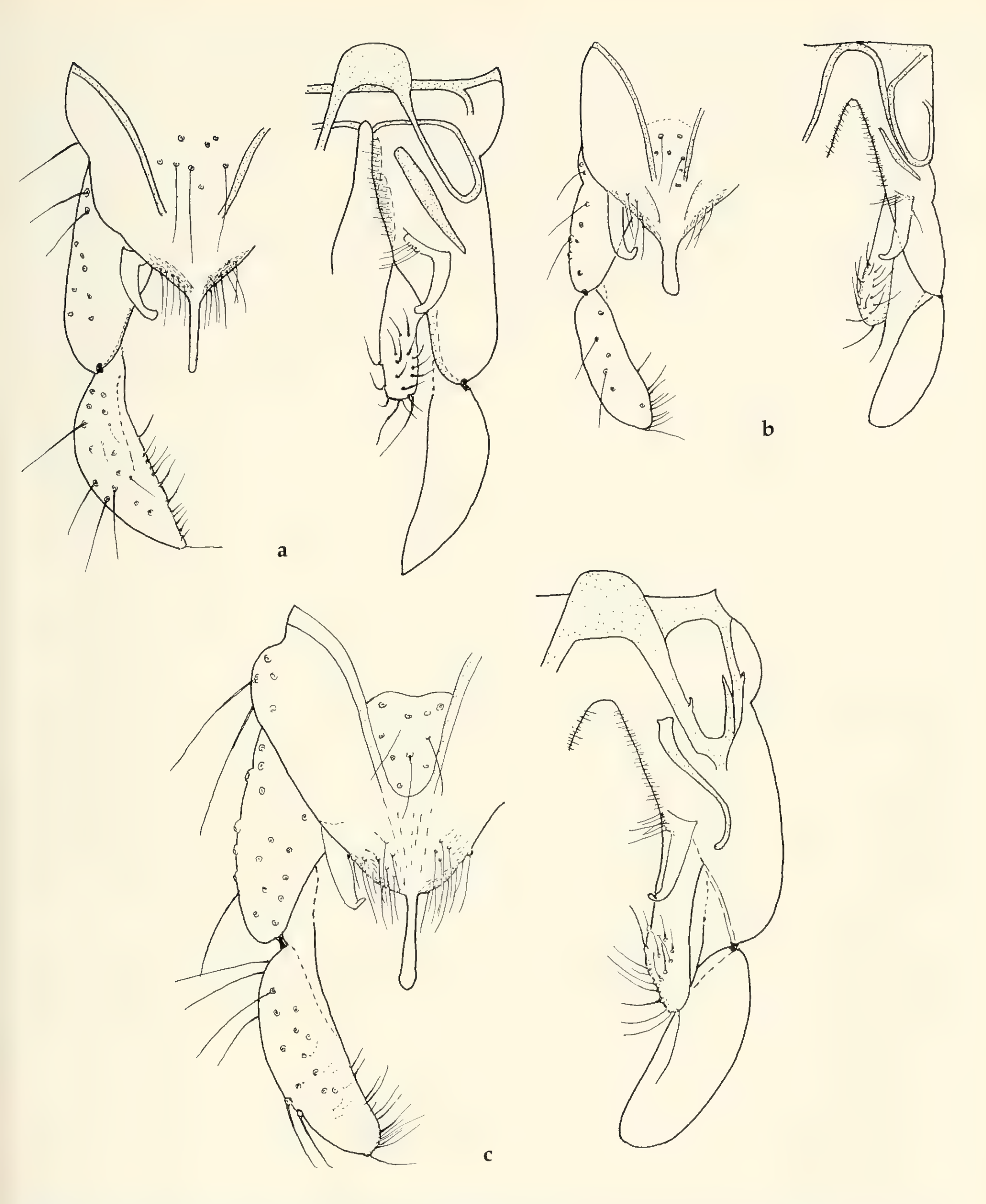


Fig. 4. Male hypopygia of **a.** *Sergentia baueri* (Black Forest); **b.** *S. prima* (Material Brundin); **c.** *S. coracina* (Titisee). Dorsal view, left side: upper parts, right side: lower parts.

Chromosome IV: One end with large heterochromatic block, other end fan shaped (if paired). Balbiani rings in about the middle of the chromosome and another not far from the non-heterochromatinized end.

Larva (based on Proviz & Proviz 1997, p. 633 and fig.1). See also Berg & Petersen 1956, fig. 82, p. 196. Length IVth larval instar 8-12 mm. Head of a yellow grey colour, brown in the region of submentum,

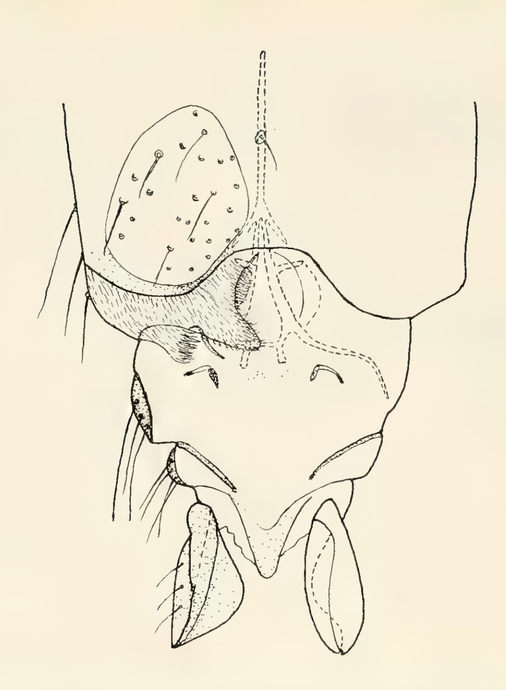


Fig. 5. Female adult of *Sergentia baueri*, posterior part of abdomen, ventral side.

width 430-480 µm. Frontoclypeal apotome light brown with a barely distinct reticular pattern in the clypeal region. Eyes round, irregular in shape, upper and lower eye of almost equal size (40 × 60 µm). Antennae with 5 segments. Basal segment 3.5-3.8 times longer than wide, ring organ situated at a distance of 15-20 µm from its base. The long ramus of sensilla longer than length of segments 2-5. The short ramus of sensilla 5-6 µm long. Lauterborn organs small, rod-shaped, not extending to the top of 3rd segment. Length of antennal segments in µm: 98 (95-105), 31(30-33), 9(7-10), 8(7-10), 4(4-5). AR=1.5-1.9. Width of 1st antennal segment at the level of ring organ (W1) 27 (25-30) µm. L1/L2 ratio 3.1, L1/W1=3.6, L2/W1=1.2.

Premandible with two teeth and a long dense barb.

Mandible 200-220 µm long, dark yellow, black on top. Distal tooth brown, inner teeth black, last inner tooth same color as the remaining ones. Apical tooth large, almost as long as the total width of the bases of the two subsequent inner teeth. Seta subdentalis thick with split top, extending to the top of the 3rd inner tooth. Internal seta split into 4 rami, of which 3 are shrub-like and 1 pectinate. Carina of mandible composed of 10-11 chaetoids.

Mentum with 4 median and 6 pairs of lateral teeth of a black-brown colour. Median teeth larger than the remaining ones, outer median teeth higher than the remaining ones, first lateral tooth lower than 2nd. Total width of central and 1st lateral teeth (M) 60-76 µm.

Ventromental lamellae large, approximately as long as the width of the basis of mentum. Anterior margin smooth. Striae most distinct at internal angles (sinuous lines), less distinct in middle part (short parallel lines), absent in distal part.

Pupa (Langton, pers.comm.). Median points of tergites III and IV very small (almost invisible under low power), contrasting with the much larger points of the anterior transverse band. Pale exuviae with combs of segment VIII golden-yellow. Length 6.4-7.8 mm (m=7.2 mm, n=14). 45-68 anal lobe taeniae (m=59.4, n=14).

Adult male (Fig.4b). Morphometric values tab.1. Clearly different from *S. coracina*, more difficult to distinguish from *S. baueri*. Diagnostic is the short spatulate anal point. Noteworthy is the briste sometimes present on the upper volsella (Fig. 4b) which was already shown in Berg & Petersen 1956 (Fig. 84)

Sergentia coracina, Zetterstedt

Zetterstedt 1824, *Chironomus coracinus*, original description.
Andersen 1937, *Pentapedilum* , adult male (drawing hypopygium), larva.
Lenz 1927, *Sergentia longiventris*, larva, pupa. Identical with Lenz 1941, *Sergentia profundorum*.
Edwards 1929, *Polypedilum (Sergentia) coracina*, adult male.
Goetghebuer 1937, *Sergentia coracina*, adult.
Bauer 1945, *Sergentia coracina*, chromosomes.
Townes 1945, *Sergentia coracina*, adult male (drawing hypopygium).
Wülker 1961, *Sergentia coracina*, larva, pupa, adult male.
Hofmann 1971, *Sergentia coracina*, mentum of larva.
Stahl 1966, *Sergentia coracina*, larva.
Saether 1977, *Phaenopsectra coracina*, adult female.
Pankratova 1983, *Sergentia coracina*, larva, pupa.
Pinder & Reiss 1983, *Sergentia coracina*, larva.
Kiknadze et al. 1991, *Sergentia coracina*, chromosomes, larva.

Karyotype (Fig.2) 2n=6. Centromeres heterochromatinized. Nucleoli in arms IL, IR and IIL. Inversion polymorphism in IIR, IIL and IV (American populations). European and American populations differ by fixed inversions in arms IR, IIR, IIIR and IV.

Chromosome I: Nucleolus IR around group 24, in European populations very distal, in American populations in proximal half. Typical puff of group 22 near middle of the arm (Europ.pop.). Nucleolus arm IL is around group 12 (about ⅓ from centromere)

Chromosome II: Distal part of IIR as in *S. prima*, but other part more complicated, especially in European populations. Arm IIL as in *S. baueri* of Far East population but area around nucleolus in group 7 somewhat obscured.

Chromosome III and IV are joint in *S. coracina*. A good marker can be found in groups 10-11 of IIIR which are adjacent to centromere in *S. baueri* and not far from centromere in American populations of *S. coracina* but inverted and near the terminal end of the arm in European populations. Other groups difficult to localize, also in IIIL. Chromosome IV has a thick heterochromatic cap in one end and at least 2 Balbiani rings at equal distances.

Larva. Length up to 18mm. Head yellow, only hind margin dark brown, hind part of gula sometimes brownish. Width about 480 µm, length 440 µm. Eyes separated at about half of eye diameter. Antenna with 5 segments, length of segments in µm: 86-114, 30-32, 14,14,6. Blade long, sometimes longer than segments 2-5. Distance of ring organ from basis L1 18-28 µm. Width of segment 1 at the level of ring organ (W1) 28 µm. Premandible with 2 teeth, extended brush. Mandible with large apical and 4 inner teeth, all dark coloured. Seta subdentalis simple, slender and long, curved distally. Mentum with 4 median teeth (the outer ones a bit higher) and 6 scarcely differing lateral teeth in a slightly bent row. Ventromental lamellae curved, anterior margin smooth. Striae in anterior part straight, more irregular towards posterior and lacking completely in distal area. Connections between anterior and posterior part of striae barely visible.

Tab. 1. Comparison of morphological data (male adults) of the 3 species.

Character	*S. baueri* (n=40) Black Forest, Material Nevers	*S. prima* (n=12) Sweden and Denmark Material Brundin and Lindegaard	*S. coracina* (n=12) Black Forest, Titisee, Material Wülker
Antennal ratio	2.26(1.95-2.42)	2.49(2.21-2.88)	3.48(3.31-3.75)
Bristle ratio	7.69(6.33-8.83)	7.0(6.0-8.0)	5.88(5.0-8.12)
Leg ratio L1	1.10(1.03-1.21)	1.06(1.05-1.1)	0.95(0.92-0.97)
Dorsocentral setae	27.3(15-34)	23(20-25)	40.25(26-49)
Acrostichal setae	18.3(13-23)	14(11-17)	11.82(9-14)
Prealar setae	9.5(6-14)	6.5(6-8)	10(7-14)
Scutellar setae	28.1	45.5(26-65)	59(50-83)
Setae on tergite IX (am-setae)	9.9(6-16)	7.66(6-9)	12.18(10-19)
Wing length (mm)	3.83(3.53-4.08)	3.82(3.7-4.0)	4.61(4.4-4.85)

Pupa (Langton, pers.comm.). Armament of tergites III-V: points of anterior transverse band larger than points of median patch; median patch more narrow towards anterior but generally quite broadly attached to the anterior band; anterior band points gradually decreasing in size towards posterior to median point size. Lateral shagreen of sternites III and IV of spinules directed laterad and arranged in irregular longitudinal rows (a good confirmatory character, although the spinules are sometimes irregularly dispersed and occasionally missing altogether.) Large exuviae (7.4-10.6 mm, m=8.9 mm, n=44. Anal lobes with many taeniae (54-103, m=72.7, n=43).

Adult male (Fig. 4c). The value 4 for the antennal ratio to be found in most descriptions is a rough estimation. Average values are approximately 3.5 (Tab. 1). Remarkably low leg ratio. The morphometric measurements , most of which are size dependent, exhibit distinct differences from those of the other species (Tab. 1). The previous drawings of the hypopygium are more or less superficial. Therefore we provide a new one (Fig. 4c).

Diagnoses

The main differences between the three species can be made clear by a simple key.

Chromosomes

1. Chromosomes 2n=6, nucleoli in arms IL, IIL and IR, heterochromatin at centromeres *S. coracina*
– Chromosomes 2n=8 ..... 2.

2. Nucleoli in arms IL and IIR, heterochromatin at centromeres and telomere arm G ..... *S. prima*
– Nucleolus in IIIR, only slight amount of heterochromatin at centromeres ...... *S. baueri*, spec. nov.

Larvae

1. Larvae large (up to 18 mm),head capsule yellow (only hind margin brown), head width/length 480/440 µm ..... *S. coracina*
– Larvae smaller (up to 12 mm), head capsule with large darker areas ..... 2.

2. Premandible with 2 teeth, head width small (480/420 µm) ..... *S. prima*
– Premandible with 4 teeth, head width/length 530/480 µm (Fig. 3) ..... *S. baueri*

Pupae (based on data of P. Langton)

1. Large exuviae (7.4-10.6 mm), anal lobes with many taeniae (54-103) crowded posteriorly in more than one rank ..... *S. coracina*
– Smaller exuviae (5.6-9.8 mm), anal lobes with fewer taeniae (28-68) usually in a single row ...... 2.

2. Median points of tergites III and IV very small, contrasting with the much larger points of the anterior transverse band ..... *S. prima*
– Anterior and median points of tergites III and IV of similar size ..... *S. baueri*

Adult males

1. Antennal ratio >3, leg ratio L1 <1. Anal point spatulate ..... *S. coracina*
– Antennal ratio < 3, leg ratio L1 >1 ..... 2.

2. Anal point spatulate (Fig. 4b), upper volsella sometimes with a single bristle ..... *S. prima*
– Anal point with parallel edges (Fig. 4a), no bristle on upper volsella ..... *S. baueri*

Ecology, distribution

Sergentia baueri prefers (at least in Europe) shallow pools or ponds, sometimes with strong current (Löschteich Falkau, forest pool St. Märgen, Lunzer Mittersee) or with a certain degree of eutrophication (meadow pool St. Peter).

The few places in which the cytologically defined species *S. prima* has been found in Europe are small, not very deep lakes, but with humous to polyhumous conditions.

S. coracina is known as northern stenothermal form in rather deep lakes (Brundin 1949). In the arctic-subarctic region it also occurs in the litoral area. Therefore a common occurrence with *S. prima* is possible. However in Central Europe, the species is confined to the profundal area, with maximal abundance mostly at 15-20 m.

S. baueri extends from West Europe (Black Forest, Alps) to the Far East of Russia. For the intermediate region, some reports of *S. "longiventris"* are present (Altai, leg. Rusanova, pers.comm. of I. I. Kiknadze; vicinity of Irkutsk, papers of Linevich et coll., Proviz et al. 1991). However, the *"longiventris"* in Linevich et al. 1991 has a larval premandible with 2 teeth and can thus hardly correspond to *S. baueri*. It appears to belong to *S. electa* (V. Proviz, pers.comm.).

S. prima has only been described for Scandinavia and Siberia (this paper).

The distribution of *S. coracina* is clearly holarctic, with a possible intermediate step in Japan. In Russia it has been reported in the area of Kaliningrad (Lake Wischnetzkoye), Scherbina 1988, Lake Glubokoye near Moscow (Sokolova & Izvekova 1996) and in the vicinity of Lake Baikal (Linevich 1964) but with no cytological evidence. In Western Europe the distribution is arctoalpine with some reports in high mountains in the intermediate region (summary see Wülker 1961). In the USA, Indiana is regarded as the southern limit for the species (Stahl 1959).

Discussion

The older literature about the genus *Sergentia* is summarized in Brundin (1949), Thienemann (1954) and Wülker (1961). The present investigation is based primarily on cytotaxonomic results. With the help of this evidence we were able to clarify the systematic situation of the existing species. We are convinced that four *Sergentia* species exist in Western Europe: *S. coracina*, the new species *S. prima* and *S. baueri* (both replacing *S. "longiventris"*) and the taxon called *"S. psiloptera"* in Brundin 1949 and Wülker 1961, which has not been characterized cytotaxonomically and may also require a new name (see Introduction). The replacement of *S. "longiventris"* by *S. prima* and *S. baueri* makes previous opinions on the ecological relevance of *S. "longiventris"* doubtful. Bauer (1945) concluded that "als eigentliche Leitform (for the "*Sergentia*-Lake", comment of authors) nur *S. longiventris* vom Typus Tjernosen und Mittersee kennzeichnend ist". In view of the present paper, however, it is most probable that Tjernosen and Lunzer Mittersee contain different *Sergentia*-species. Therefore the usefulness of *Sergentia* for lake typology must be questioned (see discussion in Brundin 1949).

Moreover, the thorough cytotaxonomic investigations of *Sergentia* species in Lake Baikal (summarizing discussion Proviz et al. 1994) casts new light on the ecological importance of the genus *Sergentia*.

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We thank O. A. Schnell and his group (Bergen/Norway) for collecting and sending *Sergentia* larvae from Norvegian lakes. Merete Farstad and Jarle Harvardstun spent some cool and wet nights there collecting nocturnal planctonic *Sergentia*. P. Jonasson and C. Lindegaard provided material from lake Gribsø/Denmark, E. A. Makarchenko (Vladivostok) collected in the Far East. V. J. Proviz (Irkustk) visited the first author for exchange of results. P. Langton (Huntingdon) kindly treated the pupae. In the USA, help in collecting and preparing was provided by Dr. Wm. Brooks, Ripon, Wisc., Dr. M. Daniels and Tom Nevers, South Band, Ind., and Mr. O'Neill, Oshkosh, Wisc. In Germany, T. Franz and R. Rössler provided important technical help. Financial support to P. Nevers came from the Fulbright Commission and Deutscher Akademischer Austauschdienst.

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3. Gangwere, S. K., Muralingan, M. C. & M. Muralingan (eds.): The Bionomics of Grasshoppers, Katydids and their Kin. – CAB International, Wallingford, 1997, 529 pp. ISBN 0-85199-141-6.

This book presents a broad, up to date review of the biology of the orthopteroid insects, i.e. the grasshoppers, katydids, crickets and praying mantises. The book contains a good general outline on the classification of the Caelifera and a chapter on recent developments in the systematics of Tettigoniidae and Gryllidae. In further parts of the book data on the distribution and behaviour are compiled. Special attention is given to problems of control and conservation. The book is written by a great number of authorities, but nevertheless gives a very balanced overview. This volume can highly be recommended to all who are interested in Orthoptera.

K. Schönitzer

4. Küster, H.: Geschichte der Landschaft in Mitteleuropa von der Eiszeit bis zur Gegenwart. – C. H. Beck Verlag, 1997, 424 S. mit 211 Abb. u. Karten. ISBN 3-406-39525-2.

Vielen, die sich im Naturschutz engagieren, ist immer noch viel zu wenig bewußt, daß man die Landschaft, die man heute vorfindet, nur aus ihrer Geschichte her verstehen kann. Viele vermeintlich natürliche Landschaften sind jahrhundertelang vom Menschen geprägte Kulturlandschaften, die man nicht mit “der Natur” in einen Topf werfen darf. Aber auch natürliche Prozesse, wie Eiszeiten, Klimaveränderungen, Erosion usw. verändern die Landschaft und hinterlassen Spuren, die zu lesen uns dieses Buch hilft. Das Werk ist reich bebildert und enthält viele Überraschungen. Es kann allen an der Natur Interessierten, die die sie umgebende Landschaft mit neuen Augen erleben wollen, wärmstens empfohlen werden.

K. Schönitzer

5. Bäumer, Ä. : Geschichte der Biologie. Band 3. 17. und 18. Jahrhundert. – Peter Lang Verlag, Frankfurt/Main, 1996, 500 S. ISBN 3-631-30317-3. und

Bäumer, Ä. : Bibliography of the History of Biology = Bibliographie zur Geschichte der Biologie. – Peter Lang Verlag, Frankfurt/Main, 1997, 307 S. ISBN 3-631-32261-5.

In dem vorliegenden 3. Band der Geschichte der Biologie werden die für die heutige Biologie sehr wichtigen Entwicklungen behandelt. Die Biologie erhielt durch die Erfindung des Mikroskopes neue Perspektiven und Dimensionen. Die Entwicklung einer tragfähigen Grundlage für die botanische und zoologische Systematik gab der Wissenschaft neuen Auftrieb und die von Linné begründete Nomenklatur wird noch heute gebraucht. Im 18. Jahrhundert sind verschiedene Spezialgebiete der Biologie entstanden, wie die Embryologie, Physiologie, vergleichende Anatomie und Morphologie. Über diese wichtigen Entwicklungen berichtet das vorliegende Buch in interessanter und detailreicher Darstellung. Sehr schön ist zum Beispiel auch die Darstellung der Anfänge einer eigenständigen Entomologie. In einzelnen Punkten, von denen zwei Beispiele genannt sein sollen, ist bei dem insgesamt hervorragenden Werk allerdings auch Kritik angebracht: Die Taxonomie ist auch heute eine eigenständige Disziplin der Biologie, keineswegs nur eine Hilfsdisziplin (S. 257). Und die Existenz von Homonymen hat nichts Grundsätzliches mit der binominalen Nomenklatur zu tun (S. 284). Insgesamt ein Band, der jedem Biologen empfohlen werden kann.

In der umfassenden Bibliographie zur Geschichte der Biologie sind über 5.000 Literaturtitel verzeichnet, von der Antike bis zum 20. Jahrhundert. Die Zitate sind nach Sachgebieten gegliedert und ermöglichen dadurch eine gute Übersicht und einen leichten Einstieg zur Fachliteratur.

K. Schönitzer

6. Gillott, C. : Entomology. Second Edition. – Plenum Press, New York and London, 1995, XVII + 798 S., zahlr. Abb. ISBN 0-306-44966-8 (hbd) bzw. 0-306-44967-6 (pbk).

This is an extraordinarily good comprehensive textbook on entomology. It is arranged in four sections: Evolution and diversity, Anatomy and Physiology, Reproduction and Development, and Ecology. Section 1 is a very good up-to-date introduction into the systematics and phylogeny of the insects, and contains a key to the orders of insects. There is an introductory chapter on each insect order, on its structure, its life history and habits, its phylogeny and classification. This section has undergone the greatest reworking, mainly because the ideas on the phylogeny of many insect orders have changed drastically during the last decades. Each chapter contains many illustrations, a summary and a short review on the relevant literature.

K. Schönitzer

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Falsification of an entomological rule: Polymorphic genitalia in Geometrid moths

(Lepidoptera, Geometridae)

Axel Hausmann

Hausmann, A. (1999): Falsification of an entomological rule: Polymorphic genitalia in Geometrid moths (Lepidoptera: Geometridae). – Spixiana **22/1:** 83-90

In this paper the universal validity of a widely accepted convention in the taxonomy of insects, i.e. the strict correlation between diversity of genitalia and species diversity, is refuted on the basis of some examples from the lepidopterous family Geometridae.

Many species of the Geometrid moth genera *Scopula* Schrank, 1802, and *Glossotrophia* Prout, 1913, show infrapopular polymorphic patterns in the structure of the lateral processi ("cerata") of the sternite 8. This phenomenon must refer to polymorphism and not to species diversity, since specimens of the various sternite types have been reared from the eggs of one single female.

Two series of specimens, in which one genitalic feature differs in a statistically significant way, cannot be interpreted as different species due to this discontinuous diversity only. Taxonomists should apply particular caution, when there are already known polymorphisms in the genitalia of related species, e.g. in the above mentioned genera. To date nearly 20 taxa on species or subspecies level are known to have true polymorphic structure of the sternite 8.

Each species with polymorphic genitalia has closely related species, which do not show such multiple patterns. Since polymorphic genitalia are a very unusual phenomenon in Lepidoptera and are unlikely developed a several times independently, the most parsimonious hypothesis is to assume silent genes in the phylogenesis of the genera *Scopula* and *Glossotrophia* to be responsable for the heterogeneity of the expression of this feature.

Key words: Polymorphism; silent genes; phylogeny; taxonomy; genitalia, Geometridae, *Scopula*, *Glossotrophia*.

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Introduction

More than 50 years ago Sterneck (1940, 1941) revised the palearctic taxa of the Geometridae subfamily Sterrhinae including about 400 species. To date the results of this fundamental work are generally accepted and applied, almost without discussion or modification. In his introduction Sterneck (1940: 7) presents the following two guiding principles to base upon his scientific research:

1) "Species diversity has to be postulated, where 'diversity' in the genitalia is found".
2) "Forms with the same genitalia belong to the same species".

"Diversity" has to be defined sensu Sterneck as two series of specimens with at least one different genitalic feature which is morphometrically measurable and does not show continuous transitions due to variability (compare Sterneck 1940: 7).

Today, the universal validity of Sterneck's second principle is often drawn into doubt in lepidopterology. Examples of species have been reported, which can be clearly distinguished from their sister species by features of wing pattern, external morphology, pheromones and/or ecological niche, but do not have valuable differences in the genitalia (e.g. Weigt 1988: 47, 1991: 22).

The first principle of Sterneck however has never been explicitely and seriously drawn into doubt. Also Träff (1965: 134) is convinced, that "the structure of the "mappa" and particularily of the "cerata" in the sternite 8 of the genus *Scopula* (Geometridae, Sterrhinae) is constant and characteristic for the separation of species". Most taxonomists in entomology consider Sterneck's first principle to be valid as tacit understanding (e.g. Petersen 1909: 203ff., Pierce 1914: XV, Wehrli 1954: VIIf., Berio 1985: 43f., Scoble 1994: 101), even if many are aware of certain limitations: For example Svensson (1967) and Holloway (1997) figure polymorphic genitalia for two different species of the genus *Scopula*, but they refer this phenomenon to continuous "variation" postulating intermediate forms.

The present study has the aim to refute on the basis of some concrete examples the universal validity of Sterneck's hypothesis of strict correlation between diversity of genitalia and species diversity. These examples have been found exactly in the subfamily Sterrhinae, which had been revised by Sterneck.

Material, methods and definitions

Material. In the last ten years the author studied the morphology of some thousands of specimens of the genera *Scopula* Schrank, 1802, and *Glossotrophia* Prout, 1913, stored in the Zoologische Staatssammlung München (ZSM). Genitalic structures of about 1.300 specimens have been examined after dissection. Some type specimens and further material from other museums have been additionally controlled.

Methods. Taxonomical work on the collection material has been done applying the 'usual' methods of morphological analysis of external and internal features (e.g. genitalia). Measurements have been done using a stereo microscope with an ocular micrometer. Several females of *Glossotrophia alba brunellii* Hausmann, 1993, which have been caught by the author in the years 1992 and 1993 in Southern Italy were taken into captivity to deposite their eggs. This mediterranean species can be reared successfully on *Silene vulgaris* even in Central Europe under laboratory conditions. The emerging moths of the F1 generation were subsequently reared under controlled conditions (father and mother identified and labelled). The emerging descendants of the F2 generation were labelled indicating the identity of the parent specimens. 17 rearings have been made, of which only the more important will be discussed in this article.

Definitions. According to the generally accepted terminology (Klots 1970) the term "genitalia" or "genitalic structure" is understood functionally in this study and includes in the genera *Scopula* and *Glossotrophia* even the sternite 8. Since the length of the valvae is fairly reduced and the sternite 8 is particularily modified and sclerotized, it is fairly probable, that the latter bears some mechanical function in the copula. Functional morphology of genitalia however still waits for detailed investigations in the genera *Scopula* and *Glossotrophia*. In both genera the genitalia often do not bear any differential features at all, except for the sternite 8, which shows stronger diverging differentiations. For this reason to date taxonomic studies dealing these genera traditionally base mainly on differential diagnostic features of the sternite 8.

The terminology of structure details follows in this article that having been established by Prout (1913: 51) and Sterneck (1940, 1941): The paired, pointed, sclerotized processes, extending caudad from caudal part the sternite 8 are called "cerata" (singular: ceras). "Mappa" is the flat, weakly sclerotized plate between these cerata in the caudal part of the sternite 8 (Klots 1970). The terminology of the various sternite types (polymorphic individual forms) is no more based on latin form names (Hausmann 1993a), but on easily understandable codes of letters as follows:

SS = sternite symmetrical; both cerata very short (Figs 1, 4, 7)
SL = sternite symmetrical; both cerata long, i.e. exceeding mappa (Figs 3, 6, 9, 12, 14, 16)
ASM = sternite asymmetrical; one ceras short, the other one of medium size (Figs 15, 17)
ASL = sternite asymmetrical; one ceras short, the other one long (Figs 2, 5, 8, 18)
AML = sternite asymmetrical; left ceras of medium size, right ceras long (Figs 11, 13)

Results

In the run of routine examinations of the sternite 8 in some species of the genera *Scopula* and *Glossotrophia* strange variants have been found, which were strongly aberrative from the normal type (see figs 1-18).

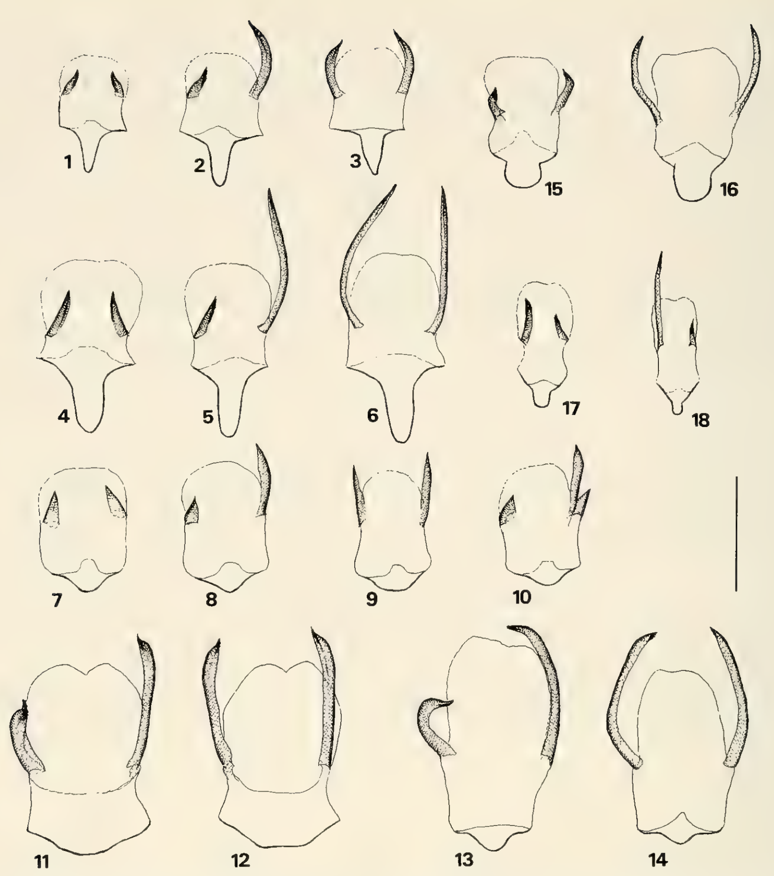
Some Lepidoptera species are known to show considerable variations in male genitalia, as it has been discussed for a Coleophorid species in Itämies & Tabell (1997) and for the Crambidae in Amsel (1951). However the above mentioned variants of Geometrid moths do not represent extreme forms of a continuous infrapopular distribution of varying features. Intermediate forms do not exist in these populations. Morphometrical measurements lead always to two or three different series, in this article called "sternite types", with no overlap between groups (see figs 19a-d, tab. 2).

In a first working hypothesis the author suggested, that this result could indicate the existence of complexes of sister species. This hypothesis became more and more improbable, since in none of these

Tab. 1. Species with true polymorphic feature patterns in the cerata of the 8. sternite of the male: Percentages of the various sternite types in light catches in the field. n = number of dissected males.

sternite type	SS	ASM	AML	ASL	SL	n
Glossotrophia confinaria (Herrich-Schäffer, 1847) (N Italy)	–	–	–	70 %	30 %	37
Glossotrophia confinaria (Herrich-Schäffer, 1847) (Makedonia)	5 %	–	–	81 %	14 %	21
Glossotrophia diffinaria Prout, 1913 (Turkey)	21 %[1]	–	–	37 %[1]	42 %[1]	19
Glossotrophia alba alba Hausmann, 1993 (C Italy)	11 %	–	–	87 %	2 %	45
Glossotrophia alba brunellii Hausmann, 1993 (S Italy)	8 %	–	–	92 %	–[2]	25
Glossotrophia mentzeri Hausmann, 1993 (Crete)	5 %	–	–	85 %	10 %	39
Scopula (Ustocidalia) ternata (Schrank, 1802) (N Europe)	5 %	–	–	90 %	5 %	21
Scopula (Scopula) transcaspica Prout, 1939 (Turkey)	–	–	5 %	–	95 %	20
Scopula (Scopula) transcaspica Prout, 1939 (Turkmenistan)	–	–	67 %	–	33 %	12
Scopula (Ustocidalia) subpunctaria (Herrich-Schäffer, 1847) (SE Europe)	–	–	67 %	–	33 %	27
Scopula (Ustocidalia) adelpharia adelpharia (Püngeler, 1894) (C Israel)	–	26 %	–	–	74 %	23
Scopula (Ustocidalia) adelpharia pharaonis Sterneck, 1933 (S Israel)	–	89 %	–	–	11 %	28
Scopula (Ustocidalia) adelpharia pharaonis Sterneck, 1933 (Sudan)	–	47 %	–	–	53 %	15
Scopula (Ustocidalia) minorata ochroleucaria (Herrich-Schäffer, 1847) (Israel)	–	4 %[3]	–	96 %[3]	–	76

[1] geographical gradient: in E Turkey SL type dominant, in W Turkey ASL type and in N Turkey SS type more abundant. In Turkey often sympatrical occurrence of all the three types.
[2] present in rearing from the egg: 1/68 = 2 %.
[3] left ceras longer than the right one here.



Figs 1-18. Sternite 8 (male) with polymorphic variants in some species of the genera *Scopula* and *Glossotrophia*. Scale bar = 1 mm. Ventral view. **1.** *Glossotrophia alba brunellii* Hausmann, 1993; S. Italy, Maratea, reared from egg "6/93"; SS type. **2.** *G. alba brunellii* Hausmann, 1993; S. Italy, Maratea, reared from egg "6/93"; ASL type. **3.** *G. alba brunellii* Hausmann, 1993; S. Italy, Maratea, reared from egg "6/93"; SL type. **4.** *G. diffinaria* Prout, 1913; C. Turkey, Gürün; SS type. **5.** *G. diffinaria* Prout, 1913; C. Turkey, Gürün; ASL type. **5.** *G. diffinaria* Prout, 1913; C. Turkey, Gürün; SL type. **7.** *Scopula ternata* (Schrank, 1802); N. Norway, Mo i Rana; SS type. **8.** *S. ternata* (Schrank, 1802); N. Norway, Mo i Rana; ASL type. **9.** *S. ternata* (Schrank, 1802); N. Norway, Mo i Rana; SL type. **10.** *S. ternata* (Schrank, 1802); N. Norway, Mo i Rana; aberrative with three cerata. **11.** *S. transcaspica* Prout, 1939; Turkmenia, Kopet Dagh; AML type. **12.** *S. transcaspica* Prout, 1939; Turkmenia, Kopet Dagh; SL type. **13.** *S. subpunctaria* (Herrich-Schäffer, 1847); Serbia, Fruska Gora; AML type. **14.** *S. subpunctaria* (Herrich-Schäffer, 1847); Serbia, Fruska Gora; SL type. **15.** *S. adelpharia adelpharia* (Püngeler, 1894); C. Israel, En Gedi; ASM type (typical for "ssp. *pharaonis* Sterneck, 1933". **16.** *S. adelpharia adelpharia* (Püngeler, 1894); C. Israel, En Gedi; SL type. **17.** *S. minorata ochroleucaria* (Herrich-Schäffer, 1847); C. Israel, Enot Zuqim; ASM type. **18.** *S. minorata ochroleucaria* (Herrich-Schäffer, 1847); C. Israel, Enot Zuqim; ASL type.

cases any further differential feature (wing colour, external morphologic features, features in the rest of the genitalia) could be found, which were correlated with one of these genitalic variants.

Polymorphisms in the structure of sternite 8 seem to be a widely distributed phenomenon in the genera *Scopula* and *Glossotrophia*: Tab. 1 shows 14 examples with the respective field percentages of the different sternite types. Furthermore, multiple feature patterns concerning sternite 8 could be found for the following (sub)species: *Glossotrophia confinaria aetnaea* Prout, 1935, *Glossotrophia confinaria scoblei* Hausmann, 1993, *Glossotrophia asiatica* Brandt, 1938, *Glossotrophia* spec. nov. (N Iran), *Scopula ansulata* (Lederer, 1871) and *Scopula lactaria* (Walker, 1861). Of these taxa only small numbers of specimens (males) were available for dissection.

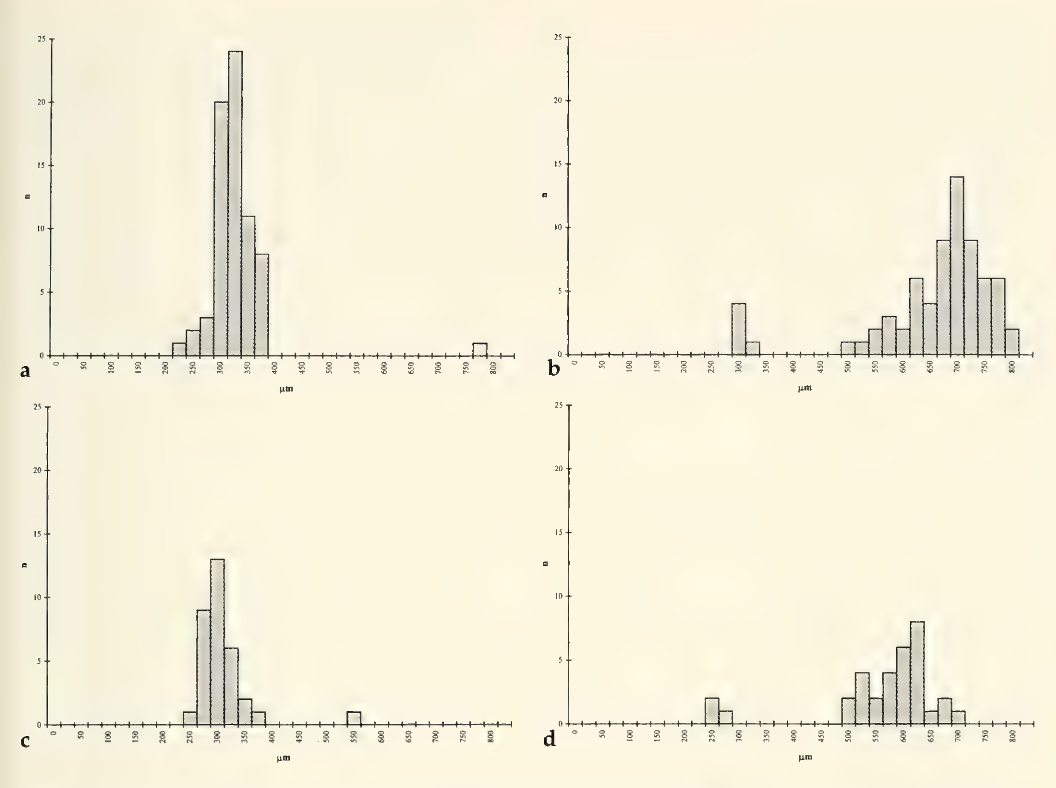


Fig. 19. Frequency distributions of length of cerata (sternite 8) in *Glossotrophia alba* from Central and Southern Italy; n = number of dissected males, µm = length of ceras in µm. **a.** Length of the left ceras in specimens from light catches (n=70). **b.** Length of the right ceras in specimens from light catches (n=70). **c.** Length of the left ceras in specimens from the rearing "6/93" (n=33). **d.** Length of the right ceras in specimens from the rearing "6/93"(n=33).

Tab. 2. Length of cerata (in µm) of the various sternite types of *Glossotrophia alba brunellii* from Southern Italy: Comparison light catches – specimens from rearing; m = mean, SD = standard deviation, n = number of dissected males.

object	sternite type	left ceras		right ceras		n
		m	**SD**	**m**	**SD**	
Light catches (1. gen.)	ASL	350	20	700	40	13
Light catches (2. gen.)	ASL	310	30	640	80	9
Light catches (2. gen.)	SS	380	0	350	0	2
F1 (rearing 2/93)	ASL	310	10	660	10	3
F1 (rearing 2/93)	SS	310	20	310	20	2
F1 (rearing 6/93)	ASL	310	30	590	50	29
F1 (rearing 6/93)	SS	270	10	260	10	3
F1 (rearing 6/93)	SL	550	–	600	–	1
F2 (rearing 9/93) (father ASL type from 6/96)	ASL	310	20	660	30	12
F2 (rearing 11/93) (father SS type from 6/96)	ASL	300	20	690	30	5
F2 (rearing 12/93) (father ASL type from 6/96)	ASL	310	10	660	40	5
Reared specimens (total)	ASL	310	20	630	60	54
Reared specimens (total)	SS	290	30	280	30	5
Light catches (total)	ASL	330	30	680	70	22
Light catches (total)	SS	380	0	350	0	2

The dry insect material stored at the ZSM gave first suggestions that such different types of the sternite 8 have been obtained from the rearing of the eggs of one single female (Hausmann 1993a: 286). For this reason the South Italian *Glossotrophia alba brunellii* has been caught and reared until the F2 generation. These experiments clearly revealed that such polymorphic feature patterns occur not only within a population but even in the rearing from the eggs of one single female (e.g. rearing "6/93", tab. 2). One male with a 'special' type of sternite 8 (SS type) has been taken for a subsequent rearing to F2, from which normal males emerged (see "11/93", tab. 2).

From the rearing "6/93" 33 males emerged as descendants of one single female. The distribution of the different sternite types shows a nearly identical feature pattern as it does in the comparison with the frequencies in light catches in the field (Figs 19a-d). Cerata are slightly longer in the field, which is due to the fact, that in this sample also moths from the first (spring) generation are included, which are somewhat larger. The emerging F1 generation in the rearing "6/93" did belong to the second (summer) generation.

Discussion

The results should implicate accurate discussions, because they throw light on interesting aspects of population genetics, phylogenetics and taxonomy. On the other hand they also raise some questions to be resolved in future.

As far as the **population genetics** is concerned, we can fix the following observations: Many species of the genera *Scopula* und *Glossotrophia* show infrapopular polymorphic feature patterns in the cerata of the male sternite 8. These are not due to individual random mutations, but are fixed genetically for the respective population in a characteristic distribution of frequency. It is proven by repeated rearing, that the different structural types do not refer to different sympatrical sister species, but to the same species.

Further investigations should clear up the way that the respective features are fixed genetically. The results of the rearing "6/93" (compare the chapter results) show too low frequencies of the 'unnormal' sternite variants, to think on one single mutated gene, which is expressed according to Mendel's rules. Even the corresponding percentages in the feature distribution between this rearing and the light catches in the field is remarkable in this context (compare figs 19 a-d).

The examined species show (in different typical patterns) the variation of the length of both the left or the right ceras. This variation occurs in all the presented species in this study without correlation with any other feature. In *Scopula lactaria, Scopula adelpharia adelpharia* and *Scopula adelpharia pharaonis* the reduction of the length of the cerata occurs obligatorily correlated in both cerata arms (Figs 15, 16), i.e. the reduction of one single arm has not been found. For the moment it must remain unclear, if this phenomenon is due to a genetical predisposition with bilateral symmetric influence or if there exist complexes of sister species in these cases.

One (rare) mutation in *Scopula ternata* with three cerata (Fig. 10) shows, that nature, apart the genetically fixed polymorphic variability, is always experimenting by individual random mutations too.

Interesting aspects result even for **phylogeny**: Despite extensive preparations of genitalia no structural variants could be found for the species *Glossotrophia rufomixtata* (de Graslin, 1863) and *Glossotrophia chalcographata* Brandt, 1938 (n = about 50 slides without polymorphic variation; Hausmann 1993b), which are both rather closely related to the polymorphic species *Glossotrophia confinaria, Glossotrophia diffinaria, Glossotrophia alba* and *Glossotrophia mentzeri*. The same must be stated for 12 furthermore examined species of *Glossotrophia* (n = about 300 slides without polymorphic variation; Hausmann 1993b). On the other hand, such polymorphisms occur in the same feature with exactly corresponding patterns in the genus *Scopula*: The similarity between the feature patterns of *Glossotrophia alba* and *Scopula ternata* is stupefying (compare figs 1-3, 7-9, and tab. 1). Many external and internal structural features clearly show however, that *Glossotrophia alba* and *Scopula ternata* are not even linked by congeneric relationship.

The predisposition to polymorphic variability can be found in both subgenera of the enormously species rich genus *Scopula* (*Scopula-Ustocidalia*). For all polymorphic *Scopula* species however there are closely related species without this predisposition. An example is the European *Scopula submutata* (Treitschke, 1828): this species is not polymorphic in the cerata of its sternite 8 even being very closely related to *Scopula transcaspica* (compare tab. 1).

As a conclusion we have to state a **mosaic pattern** of the feature "polymorphic cerata of the sternite 8" in both genera *Scopula* and *Glossotrophia*. Such phylogenetically heterogenous patterns of parallelisms can be due to underlying synapomorphies: On the base of many examples Saether (1979) refutes too restricted 'dogmatic' criteria for synapomorphies, as e.g. postulated by Schlee (1971: 23), and defines underlying synapomorphies as "parallelism as a result of common inherited genetic factors including parallel mutations" (Saether 1979: 305). Since polymorphisms in genitalia are hitherto unknown in Lepidoptera, they have to be regarded as a fairly rare phenomenon. For this reason it is rather improbable, that during the phylogenesis of the genera *Scopula* and *Glossotrophia* the genetic predisposition for such a rare polymorphic feature pattern has been developed by parallel mutations sensu Saether so many times independently. The most parsimonious hypothesis is the assumption of "**silent genes**", as they are postulated within the class of Insects for the Archaeognatha by Sturm (1994). Such silent, discontinuously active genes can be disactivated and reactivated from the "Kryptotype" (Osche 1965, Sudhaus & Rehfeld 1992) under conditions, which are little known to date. They probably are the reason for heterogenous patterns of parallelisms not only in our example of the male sternite 8 in the genera *Scopula* and *Glossotrophia*, but for some further cases of apparent mosaic evolution, which are in discussion in the taxonomy of insects.

In the future the species of both Geometrid moth genera merit becoming objects of genetical investigations, e.g. for analysing the conditions for the reactivation of silent genes. They can easily be reared and the fast reproduction (trivoltine phenology e.g. in *Glossotrophia alba*) would suit such research projects.

In the **taxonomy** of insects the results of the present study are of high importance: The universal validity of the hypothesis "different genitalia refer to different species" (e.g. Sterneck 1940: 7, Träff 1965: 134; compare introduction) is clearly refuted by the present studies. In the differential analysis of two series of specimens the following steps reveal essential:

- analysis of the morphological variability (individual variation) on the basis of extensive material
- if possible, exclusion of the possibility of structure polymorphisms, by showing correlation to other features. This step is most important when there are already known polymorphisms in related species.

All taxa whose differential analysis to a sympatrical sister species was based on one single feature in genitalia should be checked for the possibility of polymorphism (e.g. by rearing)! Just one interesting example herefore: Träff (1965) described the Geometrid moth *Scopula aequicerata* as a new species for science. In more detailed studies it revealed to be only one of the different sternite types (SL type) of *Scopula ternata* and therefore synonym to the latter (fig. 9; tab. 1; Svensson 1967).

As far as the extremely species rich genus *Scopula* is concerned (actually known about 800 valid taxa on species or subspecies level) the presented results emphasize the necessity of a comprehensive revision. Many taxa, which have been described on the base of one single differential feature in the eighth sternite, will probably have to be synonymized. The genus *Glossotrophia* has already been revised by the author (Hausmann 1993a, 1993b, 1994).

Zusammenfassung

Falsifizierung einer entomologischen Grundregel: Genitalpolymorphismen bei Geometriden (Lepidoptera, Geometridae)

In der Taxonomie der Insekten wird oft eine strenge Korrelation von signifikanten Unterschieden im Genitalapparat und Artverschiedenheit als grundlegende Übereinkunft stillschweigend vorausgesetzt. Anhand einiger Beispiele aus der Lepidopterenfamilie Geometridae wird deren Allgemeingültigkeit widerlegt.

Viele Arten der Geometridengattungen *Scopula* Schrank, 1802, und *Glossotrophia* Prout, 1913, weisen in der Struktur der lateralen Anhänge des 8. Sternits ("cerata") infrapopulare polymorphe Merkmalsmuster auf. Da die jeweiligen strukturell unterschiedlichen Formen mehrmals aus Eizuchten ein und desselben Weibchens erzielt wurden, kann es sich bei diesem Phänomen nicht um Artverschiedenheit handeln.

Zwei Individuenserien, die sich in einem Genitalmerkmal statistisch signifikant unterscheiden, dürfen daher auf der alleinigen Basis dieses Unterschieds nicht als artverschieden interpretiert werden. Besondere Vorsicht empfiehlt sich dann, wenn bei nahe verwandten Taxa bereits Genitalpolymorphismen bekannt sind, wie z.B. bei bisher knapp 20 Arten und Unterarten der Gattungen *Scopula* und *Glossotrophia*.

Man findet Arten ohne multiple Merkmalsmuster neben nahen Verwandten mit polymorphen Genitalien, wobei sich letztere mosaikartig über die jeweilige Gattung verteilen. Angesichts der Seltenheit von Polymorphismen in Lepidopterengenitalien, erscheint dessen mehrmalige, voneinander unabhängige Entstehung im Lauf der Entwicklungsgeschichte unwahrscheinlich. Die sparsamste Erklärung ist als Arbeitshypothese daher die Annahme von 'schlafenden Genen' als Ursache der Heterogeneität der zur Diskussion stehenden Merkmalsausbildung in der Phylogenese der Gattungen *Scopula* und *Glossotrophia.*

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Hasemania crenuchoides, spec. nov. – ein neuer Salmler aus dem Bundesstaat Goias, Brasilien

(Teleostei, Characiformes, Characidae, Tetragonopterinae)

Axel Zarske and **Jacques Géry**

Zarske, A. & J. Géry (1999): *Hasemania crenuchoides*, spec. nov., a new characid fish from Goias, Brazil (Teleostei, Characiformes, Characidae, Tetragonopterinae). – Spixiana **22/1:** 91-96

A new characid fish – *Hasemania crenuchoides*, spec. nov. – from Goias, Brazil, is described and compared with all known species of the genus. The new species is characterised by its compact habitus, few branched anal rays and unique colouration. A key of all known species of the genus is given.

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Unter dem von Harald Schultz (22.2.1909 bis 7.1.1966) in Brasilien gesammelten Fischmaterial, das in der Zoologischen Staatssammlung München aufbewahrt wird, fand sich ein bislang noch unbeschriebener Vertreter der Gattung *Hasemania* Ellis, 1911. Da auf diese Art in der Literatur bereits hingewiesen wurde (Géry 1972a, S. 10) und sich außerdem bereits publizierte Farbfotos finden lassen (Géry 1978, S. 540 unten) soll an dieser Stelle die längst überfällige wissenschaftliche Erstbeschreibung dieses Taxons nachgeholt werden.

Die morphometrischen Maße wurden mit einem Meßschieber mit einer Genauigkeit auf ein Zehntel Millimeter ausgeführt und nach dem Schema von Géry (1972b) ermittelt. Die Erfassung der Standardlänge (SL) erfolgte jedoch von der Schnauzenspitze bis zum Beginn der mittleren Flossenstrahlen der Caudale. Die Feststellung und Angabe der Flossenstrahlen und Schuppen wurde ebenfalls nach Géry (1972b) durchgeführt.

Hasemania crenuchoides, spec. nov.

Abb. 1, 2

Typen. Das ursprünglich ausschließlich in der Zoologischen Staatssammlung München (ZSM) aufbewahrte Material wird auf folgende Museen verteilt: Museum für Tierkunde Dresden (MTD), Museu de Zoologia da Universidade de Sao Paulo (MZUSP), Museum d'Histoire naturelle, Genève (MHNG), Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (ZFMK) und Museum für Naturkunde Berlin (ZMB).

Holotypus. MZUSP 52732, 65.8 mm Standardlänge (= SL), adultes ♂, Corrego Planaltina, oberer Rio Sao Bartolomeu (mündend in den Rio Corumba, Nebenfluß des Rio Paranaiba, La-Plata-System), 1050 m über NN, nahe Planaltina, nordöstl. von Brasilia, Distrito Federal, Bundesstaat Goias, Brasilien, etwa 15°38' südl. Breite und 47°40' westl. Länge, coll.: H. Schultz, VIII. 1965. – Paratypen: ZSM 22656, 55 Ex. 21.0-45.7 mm SL, gleiche Daten wie Holotypus; MTD F 21538-21542, 5 Ex. 43.8-67.2 mm SL, gleiche Daten wie Holotypus; Privatsammlung Géry 1010.1-5, 5 Ex. 37.4-56.6 mm SL, gleiche Daten wie Holotypus; MHNG 2594.44, 5 Ex. 30.3-38.7 mm SL, gleiche Daten wie Holotypus; ZFMK 20543-20547, 5 Ex. 28.6-31.8 mm SL, gleiche Daten wie Holotypus; ZMB 32959, 5

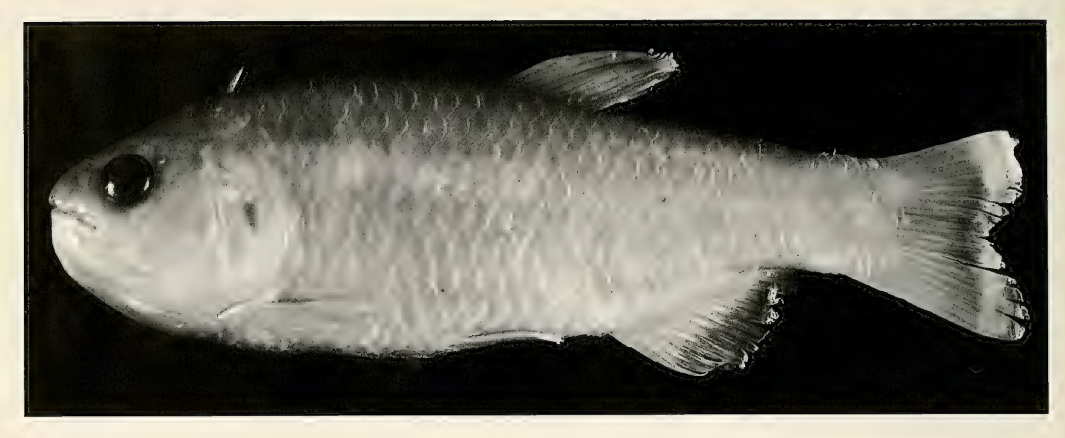


Abb. 1. *Hasemania crenuchoides*, spec. nov. Holotypus. Foto: Höhler, Staatliches Museum für Tierkunde Dresden.

Ex. 32.5-41.7 mm SL, gleiche Daten wie Holotypus; MTD F 21543-21545, 3 Ex. 41.2-46.6 mm SL, gleiche Daten wie Holotypus, Alizarinpräparate.

Diagnose. Mit bis zu 67.2 mm SL relativ groß werdender Vertreter der Gattung *Hasemania* Ellis, 1911, für die eine fehlende Fettflosse (Adipose) typisch ist. *Hasemania crenuchoides*, spec. nov. ist durch einen relativ breiten, seitlich wenig zusammengedrückten, bullig wirkenden Kopf und Vorderkörper charakterisiert. Weitere arttypische Merkmale sind: (1) die mit 11 bis 13 ($\bar{x}$ =12.27) geteilten Analstrahlen vergleichsweise kurze Afterflosse, (2) das mit zwei bis drei dreispitzigen bis konischen Zähnen verhältnismäßig stark bezahnte Maxillare, (3) die mit 29 bis 33 ($\bar{x}$ = 31.37) Schuppen in einer mittleren Längsreihe relativ kleinen Schuppen und (4) die mit acht bis 16 ($\bar{x}$ = 11.61) durchbohrten Schuppen vergleichsweise lange Seitenlinie. Die Lebendfärbung (bräunliches Netzmuster mit orangefarbener Längsbinde in der hinteren Körperhälfte und intensiv orange gefärbter Caudale) weicht ebenfalls von allen bislang bekannten Arten ab.

Tab. 1. Morphometrische Merkmale von *Hasemannia crnuchoides* spec. nov., dargestellt als Prozent der Standardlänge (35.8-67.2 mm SL; n=25). Abkürzungen: SL = Standardlänge. $\bar{x}$ = Mittelwert. x_1 = Minimalwert. x_2 = Maximalwert. S.D. = Standardabweichung. S.E. = Standardfehler.

	$\bar{x}$	x_1 - x_2	S.D.	S.E.
Körperhöhe	34,44	31,61-37,53	1,725	0,345
Kopflänge	28,28	26,72-29,84	1,000	0,200
Augendurchmesser	7,67	6,40- 9,14	0,578	0,116
Schnauzenlänge	6,13	5,20- 7,07	0,439	0,088
Maxillare	7,30	6,52- 8,40	0,513	0,105
Interorbitale	9,59	8,55-10,42	0,469	0,094
Praedorsaldistanz	54,52	50,35-56,48	1,307	0,261
Praeanaldistanz	66,97	64,04-70,99	1,559	0,312
Praeventraldistanz	50,49	46,84-53,93	1,824	0,365
D-Basis	11,27	9,45-13,28	1,024	0,209
längster D-Strahl	18,42	16,14-20,80	1,320	0,269
A-Basis	17,77	15,81-20,17	1,399	0,280
längster A-Strahl	13,99	10,00-16,49	1,637	0,334
P-Länge	17,50	13,97-20,43	1,490	0,298
V-Länge	13,70	11,38-16,88	1,339	0,268
Schwanzstielhöhe	13,13	10,87-13,90	0,681	0,136
Schwanzstiellänge	18,15	14,56-20,46	1,471	0,294

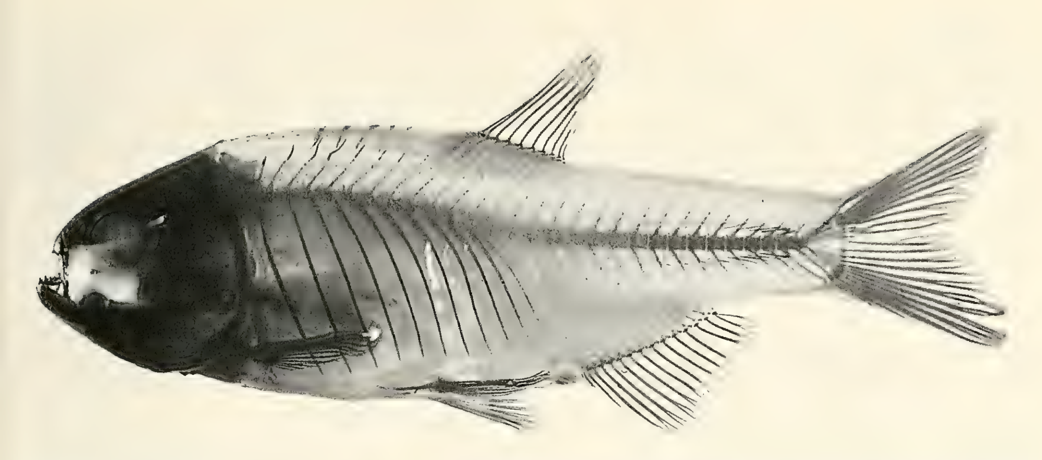


Abb. 2. *Hasemania crenuchoides*, spec. nov. Alizarinpräparat, Seitenansicht. Foto: Höhler, Staatliches Museum für Tierkunde Dresden.

Beschreibung
n=25; sofern nicht anders angegeben, 35.8-67.2 mm SL. Körper langgestreckt, seitlich relativ wenig zusammengedrückt, vergleichsweise gedrungen wirkend (Abb. 1), erinnert entfernt an eine *Crenuchus*- oder *Poecilocharax*-Art (Familie Crenuchidae) oder auch an verschiedene *Orestias*-Arten (Familie Orestiidae), die Rückenlinie steigt deutlich flacher bis zum Kopfende an als sich die Bauchlinie senkt. Nach dem Kopfende steigt die Rückenlinie nur noch schwach an, bzw. verläuft bei den größeren Exemplaren fast geradlinig. Köperhöhe 2.93 (2.66-3.54) mal in Körperlänge (=Standardlänge). Kopf relativ kurz, ebenfalls recht bullig wirkend, Kopflänge 3.50 (3.35-3.74) mal in Körperlänge. Kopfbreite in Höhe der Occipitalbasis 6.15 (5.38-7.05) mal in der Kopflänge. Auge klein, 3.71 (3.24-4.37) mal in der Kopflänge. Schnauze kurz, stumpf, 4.54 (3.74-4.92) mal in der Kopflänge. Maul unterständig, Unterkiefer kürzer als Oberkiefer. Circumorbitalia vollständig entwickelt, das dritte bis fünfte Suborbitalia bedeckt die Wangen vollständig, drittes Suborbitale sehr hoch, in Kontakt mit dem Superopercularkanal. Maxillare verhältnismäßig lang, bis unter die Pupille reichend, 3.89 (3.43-4.27)mal in der Kopflänge. Interorbitale breit, mäßig gewölbt, 2.91 (2.26-3.24) mal in der Kopflänge. Praemaxillare mit zwei Zahnreihen, in der äußeren stehen vier drei- bis fünfspitzige Zähne, in der inneren stehen fünf drei- bis fünfspitzige Zähne. Zähne an der Basis breit, wenig zusammengedrückt, Hauptspitze groß, Nebenspitzen vergleichsweise tief angesetzt. Maxillare mit zwei bis drei Zähnen, einem bis zwei größeren dreispitzigen und einem kleineren konischen Zahn. Mandibulare mit vier bis fünf fünfspitzigen Zähnen, gefolgt von einem kleineren dreispitzigen und drei bis fünf konischen Zähnen. Die Form der Zähne entspricht denen des Praemaxillare. 15-19 Kiemenreusenzähne, fünf bis sieben auf dem oberen und neun bis 12 auf dem unteren Ast des ersten, linken Kiemenbogens.

Dorsale ii 8, relativ kurz und flach, beginnt deutlich hinter der Körpermitte und noch deutlicher hinter einer gedachten Senkrechten an der Basis der Ventralen. Anale iii-iv 11-13 (i), 12.27 geteilte Flossenstrahlen im Durchschnitt (n = 87), kurz und verhältnismäßig flach, eine Reihe von fünf bis sieben Schuppen am Beginn der Basis der Flosse. Caudale xii-xiii / 9-8 / xi, Flossenlappen mäßig tief gespalten, abgerundet, an der Basis des unteren Flossenlappens mit ein bis zwei Schuppen. Pectorale i 11, relativ kurz, rund nicht zugespitzt. Ventralen ii 6, relativ klein, beginnen kurz vor oder etwa in der Körpermitte. Keine kleinen Häkchen an den Flossenstrahlen von Anale und Pectorale.

29-33 Schuppen in einer mittleren Längsreihe (x = 31.37, n = 87). Vor der Dorsale, quer über den Körper stehen 5/1/4 Schuppen. Die Axillarschuppe oberhalb der Ventrale ist jedoch schwach ausgebildet. Die Seitenlinie durchbohrt 8-16 Schuppen (x = 11.61, n = 87). Vor der Dorsale stehen 11-13 Schuppen, eine geradlinige Schuppenreihe ist praedorsal jedoch nicht immer ausgebildet. Rund um den Schwanzstiel stehen 12-13 Schuppen.

Wirbel (festgestellt im Alizarinpräparat, Abb. 2): (4)+28-29=32-33, [(Wirbel des Weberschen Apparates) + nachfolgende Wirbel = Gesamtanzahl der Wirbel]; fünf Supraneuralia.

Färbung (nach einem Farbfoto der lebenden Fische von Harald Schultz siehe Géry [1978] S. 540): Grundfärbung helloliv bis gelblich. Schuppen besonders in der oberen Körperhälfte mit bräunlichem Rand, so daß ein netzartiges Muster entsteht. Eine undeutliche orangefarbene Binde befindet sich in der Mitte der hinteren Körperhälfte. Sie endet auf dem Schwanzstiel. Ein Schulterfleck und ein Fleck in der Schwanzwurzel fehlen. Flossen helloliv mit zart pastellfarben getönten Rändern. Die mittleren Flossenstrahlen der Caudale sind schwach dunkelbraun bis schwärzlich gefärbt.

In Alkohol sind die Fische nach mehr als dreißigjähriger Aufbewahrung einheitlich gelblich bis helloliv gefärbt ohne jegliche sichtbaren Farbmerkmale. Als die Fische frisch fixiert waren, konnte ein schwach ausgeprägter, vertikaler Schulterfleck (kaum sichtbar im Leben) und ein ebenfalls schwach ausgeprägter Schwanzwurzelfleck an der Basis der Schwanzflosse und deren mittleren Flossenstrahlen (ebenfalls kaum sichtbar im Leben) beobachtet werden.

Derivatio nominis. Die Art ist benannt nach der Ähnlichkeit im Habitus mit *Crenuchus spilurus*, die durch ihren charakteristischen dicken, bullig wirkenden Kopf und Vorderkörper entsteht.

Diskussion. Von allen anderen, bislang bekannten Arten der Gattung *Hasemania* Ellis, 1911 unterscheidet sich *Hasemania crenuchoides*, spec. nov. durch (1) den auffallend bullig wirkenden Kopf und Vorderkörper, der stark an eine *Crenuchus*- oder *Poecilocharax*-Art erinnert, von denen sie sich aber durch die kurze Dorsale leicht unterscheiden läßt, (2) die mit 11-13 geteilten Flossenstrahlen vergleichsweise sehr kurze Anale (anstatt 13-15 bei *H. melanura*, 17-18 bei *H. hanseni*, 15-16 bei *H. maxillaris* und 14-15 bei *H. nana*) und (3) die einzigartige, von allen anderen bekannten Taxa abweichende Färbung (bräunliches Netzmuster mit orangefarbener Längsbinde in der hinteren Körperhälfte).

Zusätzlich zu den eben genannten Merkmalen lassen gegenüber den einzelnen *Hasemania*-Arten sich noch folgende Unterschiede erkennen: *Hasemania melanura* Ellis, 1911 (Typuslokalität: Porto Uniao, Rio Iguassú) verfügt über (1) kleinere Schuppen (33-36 in einer mittleren Längsreihe anstatt 29-33 bei *H. crenuchoides*); (2) sechs Schuppen stehen oberhalb der Seitenlinie bei *H. melanura* (anstatt fünf bei *H. crenuchoides*). Weiterhin besitzt (3) *H. melanura* weniger Kiemenreusenzähne auf dem unteren Ast des vorderen Kiemenbogens (8 anstatt 9-12 bei *H. crenuchoides*). Die Zähne im Praemaxillare und Dentale sind (4) mit bis zu sieben Spitzen bei *H. melanura* verhältnismäßig breit anstatt mit bis zu fünf Spitzen bei *H. crenuchoides*; (5) ist das Maxillare von *H. melanura* zahnlos anstatt mit zwei bis drei dreispitzigen bis konischen Zähnen bei *H. crenuchoides*; (6) ist außerdem das Maxillare von *H. melanura* kleiner als das Auge, während es bei *H. crenuchoides* etwa der Augenlänge entspricht. Schließlich bestehen deutliche Unterschiede in der Färbung: Bei *H. melanura* beginnt ein schmaler, kontrastreich abgegrenzter Längsstreifen hinter dem Kopf, der sich auf der Schwanzwurzel in einen Fleck verbreitet und bis zu den Spitzen der mittleren Schwanzflossenstrahlen reicht. *H. crenuchoides* besitzt nur einen breiten, im Leben orangefarbenen, undeutlichen Streifen in der hinteren Körperhälfte und auf der Schwanzwurzel, der sich bis zu den Spitzen der mittleren Caudalstrahlen erstreckt (siehe Foto von Harald Schultz in Géry 1978, S. 540 unten).

Hasemania hanseni (Fowler, 1949) (Typuslokalität: Goias) verfügt neben den oben bereits genannten Unterschieden in der Körperform und der Afterflosse (1) über ein längeres Maxillare (2.7-3.0 mal in der Kopflänge anstatt 3.4-4.2); (2) ein größeres Auge (3.3-3.5mal in der Kopflänge anstatt 3.7-4.4); (3) eine schmalere Interorbitale (3.3-3.6 mal in der Kopflänge anstatt 2.6-3.2) und (4) ein zahnloses Maxillare (anstatt zwei bis drei Zähne bei *H. crenuchoides*). In der Färbung zeigt *H. hanseni* ein sehr diffuses dunkles Längsband, das in der Körpermitte unterhalb der Dorsale beginnt und kontinuierlich bis zur Basis der Caudale verläuft (Böhlke 1958).

Hasemania maxillaris Ellis, 1911 (Typuslokalität: Porto Uniao, Rio Iguassú) unterscheidet sich von *H. crenuchoides* neben den oben bereits genannten Unterschieden in der Körperform und der Afterflosse durch (1) die sieben Schuppen oberhalb der Seitenlinie (anstatt fünf bei *H. crenuchoides*). Zudem ist (2) die Interorbitale deutlich schmaler (4.0- 4.1 in der Kopflänge anstatt 2.6-3.2) und (3) ist das dritte Suborbitale schmal (anstatt breit wie bei *H. crenuchoides*).

Hasemania nana (Reinhardt in Lütken, 1874) (Typuslokalität: Lagoa Santa, Rio-San-Francisco-Becken, synonym *Hasemania marginata* Meinken, 1938, Typuslokalität unbekannt) besitzt neben der abweichenden Körperform und Anzahl der Afterflossenstrahlen (1) ein Maxillare, das viel größer als das Auge ist (3.25 in der Kopflänge anstatt gleich dem Auge und 3.4-4.2mal in der Kopflänge bei *H. crenuchoides*), (2) eine geringere Anzahl von durchbohrten Seitenlinienschuppen (4-7 anstatt 8-16 bei *H. crenuchoides)*. Obwohl wir vermuten, daß *H. nana* nicht in die Gattung *Hasemania* gehört, belassen

wir dieses Taxon vorläufig in dieser Gattung. Diese Frage läßt sich erst nach einem sorgfältigen Test auf die Monophylie des Genus *Hasemania*, zu dem auch eine Revision der gesamten Gattung *Hemigrammus* Gill, 1858 einschließlich der verwandten Genera gehört, abschließend beantworten.

Das früher ebenfalls in der Gattung *Hasemania* eingegliederte Taxon *Hasemania bilineata* Ellis, 1911 mit einer vollständig abweichenden Zahnform wurde bereits von Géry (1966) in die Gattung *Coptobrycon* Géry, 1966 überführt.

Bestimmungsschlüssel (modifiziert nach Géry 1978)
für die Arten der Gattung *Hasemania* Ellis, 1911

1. 18-21 Afterflossenstrahlen (gesamt) .... 2.
– 14-17 Afterflossenstrahlen (gesamt) .... 3.

2. Körperhöhe 2.65-3.2 mal in der Standardlänge; 7/5 Schuppen quer vor der Dorsale; drei Maxillarzähne .... *H. maxillaris* (Rio Iguassú, südöstl. Brasilien)
– Körperhöhe 3.3-3.5 mal in der Standardlänge; 5/4 Schuppen quer vor der Dorsale; keine Maxillarzähne .... *H. hanseni* ("Bundesstaat Goias", Brasilien)

3. Kopf breit; vorderer Teil des Körpers besonders bei adulten Tieren dick; Körperhöhe bis 3 mal in der Standardlänge .... 4.
– Kopf und Vorderkörper nicht breit und dick, Habitus an einen generalisierten Vertreter der Gattung *Hemigrammus* erinnernd; Körperhöhe mehr als 3 mal in der Standardlänge; Maxillare zahnlos .... *H. nana* (Rio-San-Francisco-Becken, nordöstl. Brasilien)

4. Schuppen 6/(6-7) 33-36/6; Zähne im Praemaxillare und Dentale mit bis zu sieben Spitzen; Maxillare unbezahnt; acht Kiemenreusenzähne am unteren Teil des ersten linken Kiemenbogens .... *H. melanura*, Typusart der Gattung (Rio Iguassú, südöstl. Brasilien)
– Schuppen 5/(8-16) 29-33/4; Zähne im Praemaxillare und Dentale mit bis zu fünf Spitzen; Maxillare mit 2-3 Zähnen; 9-12 Kiemenreusenzähne am unteren Teil des ersten linken Kiemenbogens .... *H. crenuchoides*, spec. nov. (Quellgebiet des Rio Bartolomeu, östl. Brasilien)

Biogeographie und Ökologie

Hasemania crenuchoides, spec. nov. wurde zusammen mit *Planaltina myersi* gefangen. Böhlke (1954) stellte dieses bislang wenig bekannte Taxon der Glandulocaudinae auf, das von "Sarandy brook, Planaltina, Goiaz, Brazil" stammte. Dies ist in etwa auch das gleiche Herkunftsgebiet, in dem auch *Hasemania crenuchoides* gefangen wurde. Böhlke beschrieb sein neues Taxon anhand eines Exemplars, welches Carl Ternetz im Jahre 1923 gesammelt hatte, d.h. lange vor der Gründung von Brasilia. Mit dem Aufbau von Brasilia, der von einer großflächigen Umweltzerstörung in dieser Region begleitet wurde, begann man bekanntlich erst im Jahre 1956. Es war damals schwierig für Böhlke festzustellen, zu welchem Flußeinzugsgebiet *Planaltina myersi* zu zählen ist, da der Fundort im Quellgebiet von mehreren großen Flußsystemen liegt. Im Hochland von Goias (maximal 1250 m über NN) entspringen neben dem Rio Parana der Rio Tocantins und der Rio Sao Francisco (vergl. die Karten in Böhlke [1954] und Menezes & Géry [1983]). So liegt z.B. die Quelle riberao da Contagem, die nach Norden in den Tocantins abfließt und schließlich in den Amazonas mündet, nur vier Kilometer von der Quelle des Rio Sobrandinho entfernt, der nach Süden in den Rio Bartolomeu entwässert, welcher wiederum zum La-Plata-Systems gerechnet wird. Böhlke vermutete damals, daß der Fundort entlang der Chapada do Sarandi, im Quellgebiet des Rio Bartolomeu, etwa 15°40'S und 47°45' oder 50'W lag, welches etwas südlich der Straße Brasilia – Fortalezza, zwischen Sobrandinho und Planaltina liegt. Der seinerzeit erfolgte zweite Fund von *Planaltina myersi* (zusammen mit *Hasemania crenuchoides*, spec. nov. siehe die nachfolgende Liste der sympatrischen Characiformes) bestätigt Böhlkes Hypothese.

Ein "corrego" ist ein schmaler, natürlicher Kanal mit einem glatten Bodengrund und überaus unregelmäßigem Wasserstand. Er kann nach schweren Regenfällen sehr schnell fließendes Wasser

führen, während er in der Trockenzeit zumindest teilweise – bis auf einzelne Restwasserlöcher – austrocknen kann. Ein "riberao" trocknet dagegen niemals aus. Wenn der Corrego Planaltina also diesem Typ entspricht und mit dem Lagoa Bonito in Verbindung steht, so muß *Hasemania crenuchoides*, spec. nov. an recht extreme Lebensbedingungen angepaßt sein: Temperaturen um 17 bis 22 °C und stark wechselnde Wasserverhältnisse (schnell fließendes Wasser während der Regenzeit und Restwasserlöcher in der Trockenzeit).

Liste der zusammen mit *Hasemania crenuchoides* spec. nov. gefangenen Characiformes
(viele Arten sind bislang nur unzureichend bekannt)

Characidae

1. *Planaltina myersi* Böhlke, 1954 (Topotypisches Material).
2. *Bryconamericus* aff. *novae* Eigenmann & Henn, 1914 (Die typische Form, gesammelt von Haseman, stammt aus dem "Rio Novo" einem östlichen Nebenfluß des Rio Tocantins).
3. *Astyanax fasciatus* (Cuvier, 1819).
4. *Astyanax scabripinnis* (Jenyns, 1842).
5. *Hyphessobrycon balbus* Myers, 1927 (Topotypisches Material).
6. *Hyphessobrycon coelestinus* Myers, 1929 (Topotypisches Material).
7. *Hyphessobrycon*, spec. nov.
8. *Odontostilbe* cf. *stenodon* (Eigenmann, 1915).
9. *Oligosarcus planaltinae* Menezes & Géry, 1983.
10. *Characidium* aff. *lagosantense* Travassos, 1960 (Typusmaterial stammt vom Rio San Francisco).
11. Inc. gen. sp.

Anostomidae

12. *Leporinus* cf. *copelandi* Steindachner, 1875.

Parodontidae

13. *Parodon* cf. *tortuosus* Eigenmann & Norris, 1900.
14. *Apareiodon* cf. *machrisi* Travassos, 1957 (Typusmaterial stammt von "Alto Rio Tocantins").

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New species and new records of the genus *Scopodes* Erichson from New Guinea. Third Supplement to the "Revision of the genus *Scopodes* Erichson from New Guinea"

(Insecta, Coleoptera, Carabidae, Pentagonicinae)

Martin Baehr

Baehr, M. (1999): New species and new records of the genus *Scopodes* Erichson from New Guinea. Third Supplement to the "Revision of the genus *Scopodes* Erichson from New Guinea". (Insecta, Coleoptera, Carabidae, Pentagonicinae). – Spixiana **22/2:** 97-101

Scopodes schoenhuberi, spec. nov. is described and included in the most recent key to the New Guinean *Scopodes*. Additional records of *S. aspericollis* Baehr, *S.darlingtoni* Baehr, *S. robustus* Baehr, and *S. wei* Bell & Bell are presented.

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Introduction

During his most recent collecting trip to New Guinea in 1998, A. Riedel, München, again captured a number of specimens of the genus *Scopodes* in Papua New Guinea, of which one species is new though closely related to *S. hornabrooki* Baehr, a species described recently.

All measurements and ratios were obtained in the same manner as in the revision of the *Scopodes* of New Guinea (Baehr 1994) and both supplements to this revision (Baehr 1995, 1998).

The types and the additional material is preserved in the Zoologische Staatssammlung München (ZSM) and in the working collection of the author (CBM), in part also as a permanent loan (ZSM-CBM).

Scopodes aspericollis Baehr

Baehr, 1994: 109; 1998: 146.

New record: 1♂, Papua NG, Morobe-Pr., Saureri, 10 km s. Garaina, 1800-2100 m, 26.3.1998, A. Riedel (CBM).

A species known so far only from a small area around Wau and from the Eastern Highlands in Papua New Guinea. The new record slightly enlarges the range to the southeast.

* Results of the entomological collectings of A. Riedel in New Guinea in 1998

Scopodes wei Bell & Bell

Bell & Bell, 1989: 160; Baehr 1994: 112; 1998: 148.

New record: 1♂, Papua NG, Morobe-Pr., Aseki-Menyamya, 2000-2200 m, 12.4.1998, A. Riedel (CBM).

The new record is located within the rather restricted range of this species in eastern Papua New Guinea.

Scopodes darlingtoni Baehr

Baehr, 1994: 122; 1995: 112; 1998: 148.
Scopodes basalis Darlington, 1968: 200 (nom. praeocc.)

New records: 9♂♂, 5♀♀, Papua NG, Morobe-Pr., Aseki, Oiwa, 1700-1800 m, 10.-11.4.1998, A. Riedel (CBM, ZSM); 1♂, Papua NG, Morobe-Pr., Aseki, Oiwa-Langama Rd. 1600-1700 m, 13.3.1998, A. Riedel (CBM); 1♀, Papua NG, Morobe-Pr., Aiewa nr. Podu, s. Aseki, 1500-1700 m, 14.4.1998, A. Riedel (CBM).

This is a widespread species that ranges over large parts of Papua New Guinea. The repeated records apparently demonstrate that it is one of the commonest species of the New Guinean *Scopodes*.

Scopodes robustus Baehr

Baehr, 1994: 132.

New records: 1♀, Papua NG, Morobe-Pr., Aiewa nr. Podu, s. Aseki, 1500-1700 m, 14.4.1998, A. Riedel (CBM); 2♂♂; Papua NG, Morobe-Pr., Aseki, 1200-1400 m, 14.4.1998, A. Riedel (CBM).

This species was so far recorded from central and eastern Irian Jaya only. The new records considerably enlarge the range to the east and demonstrate that the species is distributed at least over the whole of the montane centre of New Guinea.

Scopodes schoenhuberi, spec. nov.
Figs 1, 2

Types. Holotype: ♀, Papua NG, Morobe-Pr. Saureri, 10 km s. Garaina, 1400-1700 m, 22.3.1998, A. Riedel (ZSM-CBM). – Paratype: 1♀, Papua NG, Morobe-Pr. Saureri, 10 km s. Garaina, 1800-2150 m, 26.3.1998, A. Riedel (CBM).

Diagnosis. Small, short, and very wide, bright green species with posteriorly markedly widened elytra, blue, rather little contrasting elytral foveae, and yellow legs and antennae. Further distinguished from the most closely related species *S. hornabrooki* Baehr by incomplete elytral striation, comparatively wider pronotum, and comparatively shorter elytra.

Description

Measurements. Length: 3.2 mm; width: 1.5 mm. Ratios. Width head/pronotum: 1.14-1.15; width/length of pronotum: 1.32-1.34; width elytra/pronotum: 1.68-1.70; length/width of elytra: 1.17.

Colour. Bright green, elytra with some cupreous reflexions. Labrum, clypeus, and mandibles black. Antenna yellow, faintly darkened towards apex. Legs light yellow, apices of tarsomeres dark.

Head. Eyes large, space between inner border of eyes about as wide as diameter of eye. Labrum rather short and wide, gently triangular, anterior border fairly convex, 6-setose, in basal part medially impressed. Clypeus with shallow, transverse sulcus, basal part irregularly striate, glossy. Labrum, clypeus, and anterior part of frons with some very inconspicuous additional hairs. Anterior triangular field of frons more or less wrinkled, rather glossy. Frons between eyes with c. 7 deep, rather straight and regular sulci that reach far posteriorly. Summit and neck coarsely wrinkled, impunctate. Whole upper surface of head smooth, glossy. Antenna short, median segments c. 1.1-1.2 × as long as wide. Pronotum. Convex, wide, rather trapezoidal, widest at lateral triangular process in anterior third. Lateral border line distinct. Margin anteriorly convex, posteriorly of lateral triangular process almost



Fig. 1. *Scopodes schoenhuberi,* spec. nov. Habitus. Length: 3.2 mm.

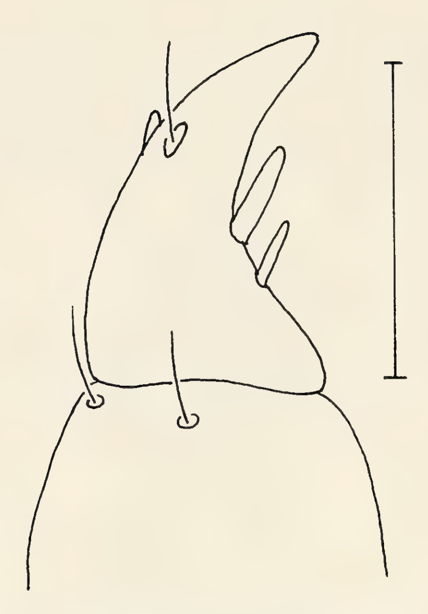


Fig. 2. *Scopodes schoenhuberi*, spec. nov. ♀ stylomeres 1 and 2. Scale: 0.1 mm.

straight, in front of posterior angles not concave. Lateral triangular process distinct, fairly small, laterally rather projecting. Posterior marginal seta absent. Anterior margin slightly convex, posterior margin straight. Median line distinct, deep, not reaching apex nor base. Transverse sulcus in apical third barely visible. Whole upper surface with very coarse, rather dense, in posterior part fairly regular transverse sulci. Surface almost without puncturation, without microreticulation, rather smooth, glossy.

Elytra. Very short and wide, moderately convex. Base comparatively narrow, elytra markedly widened towards apex, widest in apical third. Sides strongly rounded, in anterior third rather deeply excised. Apex rather wide, apical border oblique, distinctly sinuate. Surface in basal third deeply striate and intervals markedly convex. Apical half feebly and irregularly striate. Foveae in third interval wide, moderately deep, not much contrasting. Surface rather uneven. Microrecticulation rather conspicuous, consisting of very dense, more or less transverse meshes that are remarkably irregular around the discal foveae. Surface with strong sericeous lustre. Pilosity very sparse and short. Marginal pores comparatively large, contrasting. Wings short.

Lower surface. Metepisternum c. 1.3 × as long as wide. Abdominal sternites with extremely sparse and short pilosity, without distinct microreticulation. Terminal visible abdominal sternite with faint medial incision.

♂ genitalia. Unknown.

♀ genitalia (Fig. 2). Stylomere 2 medium-sized, rather curved, with dorsal ensiform and nematiform seta and with two ventral ensiform setae, namely a longer and stouter upper one and a smaller lower one. Apex of stylomere 1 with 1-2 elongate hairs. Lateral plate fairly densely setose.

Variation. Very little variation recognized.

Distribution (Fig. 10). Western part of Papuan Peninsula, Papua New Guinea. Known only from type locality.

Collecting circumstances. Caught in median altitude between 1400-2150 m, presumably in open places on the ground.

Etymology. The name is an acronym in honour of Mr. Peter Schönhuber who generously supported the biosystematic research at the Zoologische Staatssammlung München.

Relationships. This species belongs to the *chimbu*-group of New Guinean *Scopodes* (Darlington 1968, Baehr 1994, 1995, 1998) and probably is most closely related to *S. hornabrooki* Baehr and perhaps also to *S. perfoveatus* Baehr, even when the male genitalia of the latter species and of *S. schoenhuberi*, spec. nov. are still unknown. Apart from colouration and some slight differences in relative shape of prothorax and elytra, the main difference between *S. hornabrooki* and *S. schoenhuberi* is the incomplete elytral striation of the latter.

Recognition

In the most recent key to the *altus-*, *chimbu-*, and *violaceus*-groups of the genus *Scopodes* (Baehr 1998) *S. schoenhuberi*, spec. nov. would key out at couplet 5, which should be altered as following (figures of preceding supplements added in bold type as **BA95** and **BA98**):

5. Colour bright green or cupreous; transverse strioles of pronotum coarse and irregular; microreticulation of elytra very distinct; aedeagus with straight lower surface and with slightly knob-shaped apex, or unknown .... 6.
– Colour blackish-bronzed with greenish and purplish tinge; transverse strioles of pronotum less coarse, rather regular; microreticulation of elytra superficial; aedeagus with evenly concave lower surface and with short, markedly knob-like apex (**BA98** fig. 1). Central Irian Jaya .... *amplipennis* Baehr

6. Antenna black, only basal antennomeres yellowish; besides the foveae at 3rd stria elytra with a setiferous fovea in basal fourth of 5th stria (**BA95** fig. 3); aedeagus unknown. Western Highlands of Papua New Guinea .... *perfoveatus* Baehr
– Antenna yellow throughout, at most slightly darkened towards apex; elytra without additional fovea at 5th stria; aedeagus with straight lower surface and with slightly knob-shaped apex (**BA98** fig. 2) or unknown .... 6a.

6a. Colour cupreous; elytral striae deep throughout; aedeagus with straight lower surface and with slightly knob-shaped apex (**BA98** fig. 2). Eastern Highlands of Papua New Guinea .... *hornabrooki* Baehr
– Colour bright green; elytral striae only in basal third deep, posterioly very shallow; aedeagus unknown. Western part of Papuan Peninsula, Papua New Guinea .... *schoenhuberi*, spec. nov.

Acknowledgements

I am pleased to express my thanks to Mr. A. Riedel, München, for kindly submitting his material for identification. I also thank Mrs. R. Kühbandner for preparing the colour plate.

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Baehr, M. 1994. Revision of the genus *Scopodes* Erichson from New Guinea (Insecta, Coleoptera, Carabidae, Pentagonicinae). – Spixiana **17**: 97-155

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Darlington, P. J. Jr. 1968. The Carabid Beetles of New Guinea. Part III. Harpalinae (Continued): Perigonini to Pseudomorphini. – Bull. Mus. comp. Zool. **137**: 1-253

7. Sedlag, U.: Tiergeographie. Urania Tierreich Bd. 7. – Urania Verlag, Leipzig, 1995, 447 S. ISBN 3-332-00387-9.

Der vorliegende siebte Band des neuen Urania Tierreiches bietet dem Leser einen umfangreichen Überblick über die Verbreitung der Tiere der Welt. Die Tiergeographie als Wissenschaft wird umfassend und aktuell dargestellt. Das Buch ist ausgesprochen gut gelungen, es ist sehr gut, oft geradezu spannend zu lesen und hervorragend bebildert. Der Text enthält trotzdem eine außerordentlich große Informationsfülle, so daß es auch als Nachschlagewerk und Kompendium geeignet ist. Leider ist in dem Text nicht die jeweilige Originalliteratur zitiert, sondern nur am Ende des Bandes ein Literaturverzeichnis zusammengestellt. Ein Werk, das man uneingeschränkt empfehlen kann und dem man eine weite Verbreitung wünscht. K. Schönitzer

8. Remaudière, G. & M. Remaudière: Catalogue des Aphididae du monde / Catalogue of the world's Aphididae, Homoptera Aphididoidea. – Institut National de la Recherche Agronomique, Paris, 1997, 475 S. ISBN 2-7380-0714-7.

This catalogue has been compiled to give an up-to-date review on the taxonomy of Aphididae. In the catalogue the genera and species are listed alphabetically in their subfamily or tribe. All taxonomic changes which have occurred since 1976 are cited, and new data are given and commented. The extensive bibliography covers the taxonomy and various fundamental publications on biology, distribution and phylogeny of the Aphididae. An index of all the taxa (valid or not) of any rank treated in the catalogue with more than 8600 generic and species names is given. This volume will be very helpful for all scientists working on aphids. K. Schönitzer

9. Berger, H., Foissner, W. & F. Kohmann: Bestimmung und Ökologie der Mikrosaprobien nach DIN 38 410. – Gustav Fischer Verlag, Stuttgart, Jena, Lübeck, Ulm, 1997, 291 pp. ISBN 3-437-25026-4.

Neben den Makroorganismen, wie Insekten, haben auch 80 Taxa von Mikroorganismnen wie Bakterien, Pilze und Protozoen Eingang in die Saprobier-DIN-Liste gefunden. In den einleitenden Kapiteln dieses Buches werden die Probenahme und Untersuchung, die Häufigkeitsschätzung und die Berechnung des Saprobienindex beschrieben. Anschließend werden die Bestimmungstechniken ausgeführt. Diesen allen vorangestellt ist eine tabellarische Einstufung und ökologische Kurzcharakteristik der Mikrosaprobien, wobei allerdings das Fehlen auch einer kritschen Stellungnahme zur Wasserqualitätsbeschreibung besonders im Hinblick zur Verbreitung bzw. Biogeographie und Verschleppung auffällt. Dieser Mangel weist auf die Zielgruppe der Anwender, besonders Biotechniker und Limnologen hin, nicht aber auf Biologen. Von herausragender Bedeutung dagegen ist der beschreibende 237 Seiten umfassende Teil der Taxa unter Einbeziehung ökologischer Daten, dem jeweils gruppenspezifisch ein Bildbestimmungsschlüssel (insges. 16) vorangestellt ist. Bei den 'Kurzbeschreibungen' sind auf 86 Tafeln 940 Abbildungen mit Detaildarstellungen aber auch rasterelektronenmikroskopischen Bilder enthalten ebenso wie Hinweise zu Verwechslungsmöglichkeiten und zur Ökologie. Die zu verwechselnden Nicht-DIN-Arten sind leider nicht abgebildet, so daß die differentialdiagnostischen Angaben schwer nachvollziehbar sind. Auch erscheinen diese nicht in den Bildbestimmungsschlüsseln (z.B. *Paracolpidium*), was die Bestimmungswege fragwürdig erscheinen läßt. Ein Buch für Techniker der Gewässerforschung, aber auch für Interessenten des Mikrokosmos des Lebensraumes Süßwasser, der hier allerdings nur in einem kleinen Teilbereich vorgestellt wird. E.-G. Burmeister

SPIXIANA	22	2	103–107	München, 01. Juli 1999	ISSN 0341-8391

Beschreibung von zwei neuen Arten aus der Gattung *Borbotana* Walker, 1858 aus Südost Asien

(Insecta, Lepidoptera, Noctuidae, Amphipyrinae)

Gottfried Behounek

Behounek, G. (1999): Description of two new species of the genus *Borbotana* Walker, 1858 from South East Asia (Insecta, Lepidoptera, Noctuidae, Amphipyrinae). – Spixiana **22/2:** 103-107

Borbotana piskatschekae, spec. nov. from Flores and *B. petrae,* spec. nov. from the Philippines are newly described and compared with *B. nivifascia* Walker, 1858, the type-Species of the genus *Borbotana.*

Gottfried Behounek, Jägerstrasse 4a, D-82041 Deisenhofen, Germany.

Einleitung

In der Gattung *Borbotana* waren bisher sieben gut differenzierbare Arten bekannt, wovon sechs Arten ausschließlich auf Neu Guinea vorkommen. Einzig *Borbotana nivifascia* Walker, 1858 – die Typusart der Gattung *Borbotana* – ist nahezu im ganzen orientalischen Bereich anzutreffen und erreicht im südlichen China das palaerktische Faunengebiet. Umfangeiche Forschungsreisen von mehreren Sammlern in der südostasiatischen Inselwelt, speziell auf den Philippinen und in Indonesien, brachten viele neue Arten zu Tage und werden es auch in Zukunft tun. Leider sind Fauna und Flora in diesen Gebieten durch Brandrodung und rigoroser Abholzung des Primärwaldes stärker denn je gefährdet. So ist die Beschreibung von zwei weiteren bisher unbekannten Arten auch als Beitrag zur Dokumentation und Kenntnis des Artenspektrums dieser Region zu sehen.

Borbotana piskatschekae, spec. nov.

Abb. 1, 4

Typen. Holotypus: ♂, Indonesien, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (N) 9 km E Rutang, 1140 m Sec.-Prim.forest, 14.-15.4.1996, leg. R. Brechlin (coll. Behounek, ZSM München). – Paratypen: 1♂, 2♀♀. gleiche Daten (coll. Behounek); 1♂, Indonesien, Flores, Prov. Nusa Tenggara Timur Gunung, 18 km E Labuhanbajo, 200 m Prim.forest, 9.-12./22.4.1996, leg. R. Brechlin (coll. Behounek); 1♂, Indonesien, Flores, Prov. Nusa Tenggara Timur Gunung, Ranggawatu, Telekom-stat. 33 km E Labuhanbajo, 900 m, Prim.forest, 13.4.1996, leg. R. Brechlin (coll. Behounek); 1♂, 1♀, Indonesien, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, Prim.forest, 17.-21.4.1996, leg. R. Brechlin (coll. Behounek).

Beschreibung

Vorderflügellänge 13-14mm. ♂ Fühler bewimpert. Vorderflügel einfarbig, dunkelbraun, das Mittelfeld durch zwei weiße Querlinien deutlich begrenzt. Die innere Querlinie breit, an der Costa geteilt. Im Bereich des Wurzelstrahles mit deutlichem Vorsprung. Die äußere Querlinie um die Zelle gebogen.

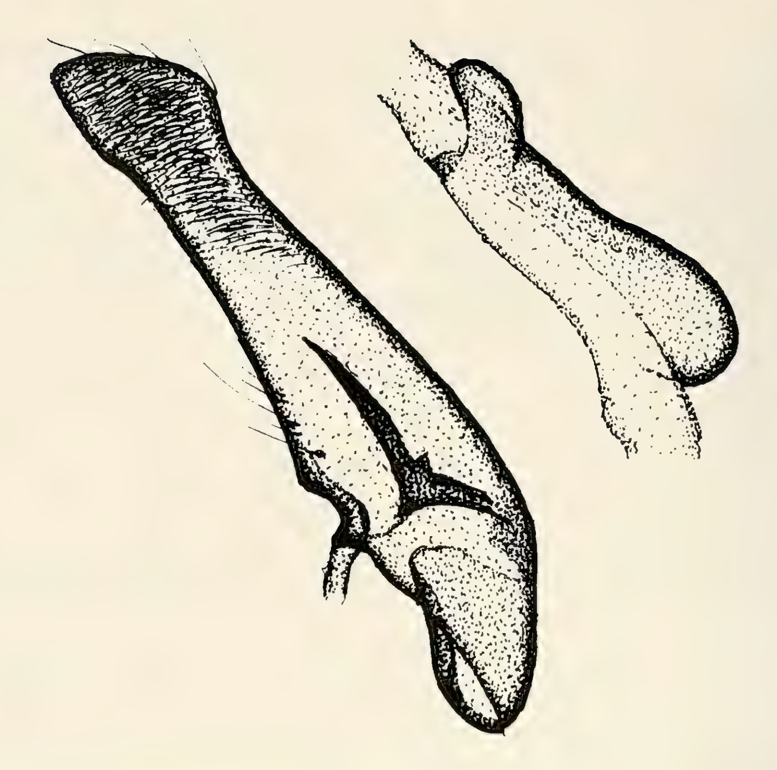


Abb. 1. *Borbotana piskatschekae*, spec. nov., Holotypus, ♂ Genital.

Der Ringmakel weniger, der Nierenmakel deutlich ausgeprägt, aussen weiß begrenzt. Die Postmediallinie ebenfalls weiß, stark gezackt, fließt im unteren Drittel mit der äußeren Mittelfeldlinie zusammen.. Die Hinterflügel bei beiden Geschlechtern braun, zur Wurzel hin heller. Der Zellfleck und die Aussenbinde oberseits deutlich sichtbar.

♂ Genital (Abb. 1). Valve schlank, an der Valvula etwas verbreitet, Corona schwach entwickelt. Sacculus nicht sehr stark sklerotisiert. Sacculusfortsatz ein kräftiger gerader Dorn. Aedeagus gerade, am distalen Ende mit deutlicher Ausbuchtung. Vesica lang und schlauchförmig, ohne Cornuti. Die anderen Teile des männlichen Genitalapparates weisen keine wesenlichen Artmerkmale auf.

Verbreitung. Die neue Art ist bisher nur von der Insel Flores bekannt, wo sie allerdings fast alle Höhenlagen bis etwa 1300 m mit Primärwald besiedelt.

Etymologie. Die Art ist Frau Seybold, geborene Piskatschek gewidmet. Dem Ehepaar Seybold ist die Zoologische Staatssammlung zu tiefen Dank für die Unterstützung zoologischer Forschungsarbeiten verpflichtet.

Borbotana petrae, spec. nov.
Abb. 2, 5

Typen. Holotypus: ♂, Philippinen, N.Luzon, Prov. Ifugao, Banaue, 20 km N Laguna, 1200 m, (Sekundäwald/ Reisfelder), 121°06'E,16°54'N, leg. Cerny & Schintlmeister (coll. Behounek, ZSM, München). – Paratypen: 2♀♀, Philippinen, Mindanao, Bukindon, Mt.Binansilang, 1200 m, (Bergurwald), 7°55'N 124°40'E, 6.Okt.,1988, leg.Cerny & Schintlmeister (coll. Behounek, ZSM, München); 1♀: Philippinen, Mindanao, Bukidon, Dalongdong, 800 m, 40 km NW Maramang Tekalag, (Urwaldrand), 7°55'N 124°40'E, 5.Okt.,1988, leg.Cerny & Schintlmeister (coll. Behounek).

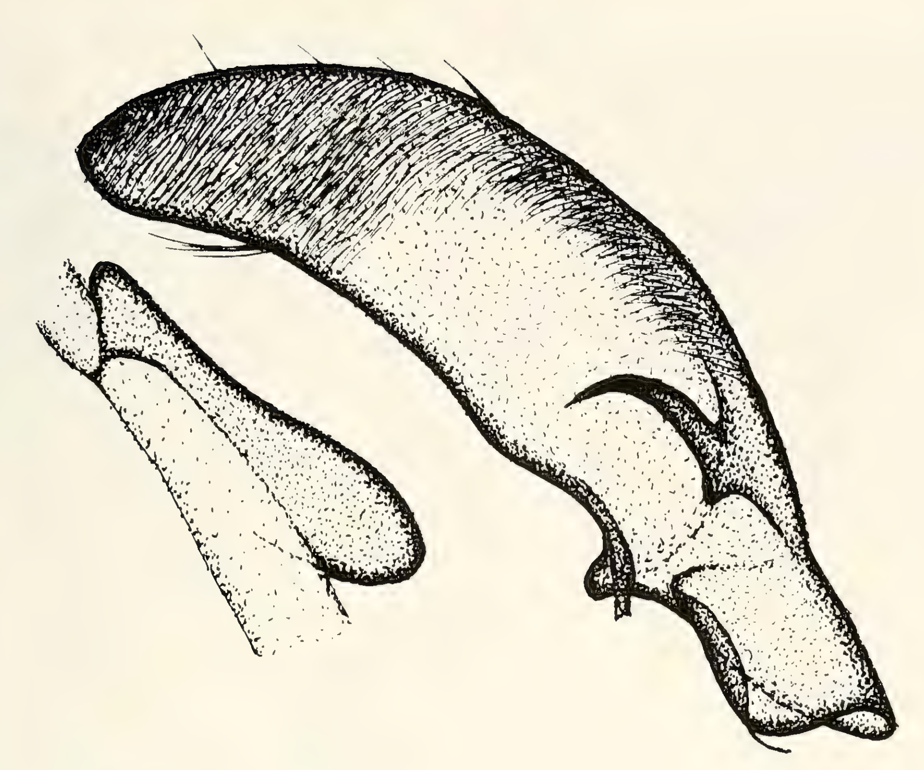


Abb. 2. *Borbotana petrae*, spec. nov., Holotypus, ♂ Genital.

Beschreibung

Vorderflügellänge 12.5-13.5mm. ♂ Fühler kurz bewimpert. Vorderflügel einfarbig, dunkelbraun, das Mittelfeld durch zwei fast gerade, dünne, weiße Querlinien deutlich begrenzt. Die innere Querlinie im Bereich des Wurzelstrahles mit deutlichem Vorsprung. Die äußere Querlinie bei der Zelle etwas geknickt. Ring- und Nierenmakel nur angedeutet. Die Postmediallinie ist ebenfalls weiß, im oberen Drittel gerade, zum Hinterwinkel hin stark gezackt und erreicht hier den Flügelsaum. Die Hinterflügel bei beiden Geschlechtern braun, zur Wurzel hin etwas aufgehellt. Der Zellfleck und die Aussenbinde oberseits kaum sichtbar.

♂ Genital (Abb. 2). Valve wie bei *B. nivifascia* gebogen, Corona gut entwickelt. Sacculus nicht sehr stark sklerotisiert. Sacculusfortsatz ein kräftiger gebogener Dorn. Aedeagus gerade, am distalen Ende ohne Ausbuchtung. Vesica lang und schlauchförmig, ohne Cornuti.

Verbreitung. Die Art ist bisher nur von den Inseln Luzon und Mindanao aus Höhenlagen von 800-1200 m bekannt, wo sie sympatrisch mit *B. nivifascia* vorkommt.

Etymologie. Die Art ist meiner Tochter Petra gewidmet.

Differentialdiagnose

Aufgrund der ausgeprägteren Vorderflügelzeichnung sind die beiden neuen Arten problemlos von *B. nivifascia* zu trennen. Die Valve von *B. nivifascia* (Abb. 3) ist breit und gebogen. Der Sacculusfortsatz ist ebenfalls stark gekrümmt. Der Aedeagus zeigt im mittleren Teil eine starke Ausbuchtung, welche bei den neuen Arten in dieser Form fehlt. Die anderen Teile der männlichen Geschlechtsapparate sind nahezu identisch und zur Artdifferenzierung nicht relevant. Die weiblichen Genitale sind ebenfalls sehr ähnlich zueinander. Bursae länglich, unten etwas verbreitert, Ductus bursae schwach sklerotisiert, sehr lang und schlank.

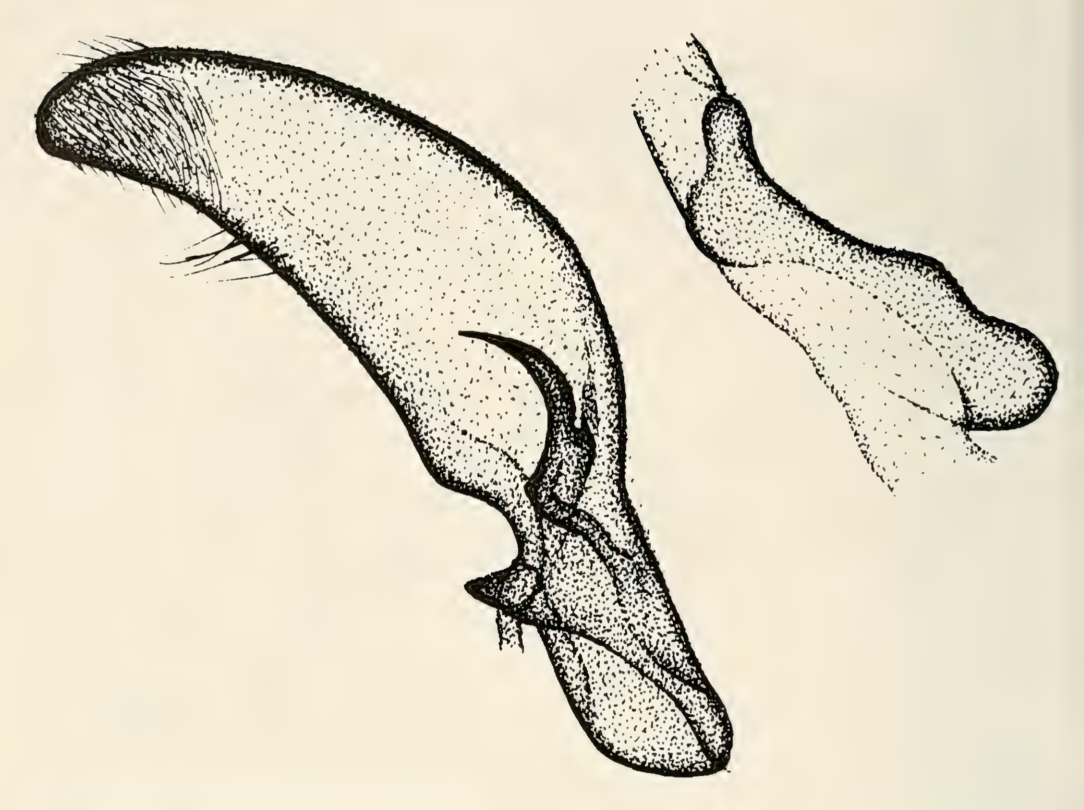


Abb. 3. *Borbotana nivifascia* Walker, ♂ Genital.

Zusammenfassung

Zwei neue Noctuidenarten, *Borbotana piskatschekae*, spec. nov. von der Insel Flores und *Borbotana petrae*, spec. nov. von den Inseln Luzon und Mindanao werden neu beschrieben und mit *B. nivifascia*, der Typusart der Gattung *Borbotana* verglichen.

Danksagung

Für die Überlassung des Untersuchungsmateriales möchte ich mich bei den Herren R. Brechlin (Pasewalk), K. Cerny (Zirl), und A. Schintlmeister (Dresden) bedanken. Für die Anfertigung des Fotos gebührt Frau M. Müller mein besonderer Dank. Das Aquarell wurde von Frau R. Kühbandner angefertigt, auch hierfür herzlichen Dank.

Abb. 4. *Borbotana piskatschekae*, spec. nov., Paratypus, Habitus.

Abb. 5. *Borbotana petrae*, spec. nov., Paratypus, Habitus.

10. Remmert, H.: Spezielle Ökologie – Terrestrische Systeme. – Springer-Verlag, Berlin, Heidelberg, New York, 1997, 257 pp. ISBN 3-540-58264-9.

Nachdem in dieser Reihe der 'Speziellen Ökologie' die marinen und limnischen Systeme bereits erschienen sind, wird hiermit von einem renommierten Autor nach seinem Tode sein Teil zu den terrestrischen Systemen präsentiert. Sicher sind gerade diese kaum in ihrer Gesamtheit zu dokumentieren, so daß auch Remmert einige Teilbereiche herausgreift und in besonderer Weise erklärt, wobei die Erfahrung des Autors aus den verschiedensten biogeographischen Regionen der Erde zum Ausdruck kommt. Beispiele aus den subtropischen, tropischen und tropisch montan geprägten Waldarealen, mediterranen Systemen, Steppengebieten und natürlich waldfreien Arealen in Mitteleuropa, borealen Waldtypen sowie Mooren und Tundren werden dem Leser anschaulich vermittelt, wobei ein Typus als Beispiel für die Interpretation dient. Dabei stehen die Wechselbeziehungen zwischen Pflanze und Tier unter dem Einfluß von Klima, Geologie in den verschiedenen Ökosystemen im Vordergrund. Den Abschluß bildet ein Exkurs durch die Kulturlandschaften, künstliche Landschaftsbestandteile mit spezifischen ökologischen Bedingungen. Ein bespielangereichertes Buch für eine breite Leserschaft, das nie den Anspruch umfassender Dokumentation erhebt. Das umfangreiche Literaturverzeichnis eröffnet diese Möglichkeit.

E.-G. Burmeister

11. Kleine-Tebbe, J.: Pollen, Milben und Co. Was tun bei Allergien? – Edition medpharm, Scientific Publishers, Stuttgart, 1997, 136 pp. ISBN 3-88763-055-6.

Allergien nehmen in den vergangenen Jahrzehnten deutlich zu und die Akzeptanz, hier von einer Krankheit zu sprechen, ist seit längerem erfolgt. Immer mehr Menschen tragen die Bereitschaft in sich, auf Stoffe aus der Umwelt allergisch zu reagieren. Erkrankungen wie der allergische Schnupfen, allergisches Asthma und das atopische Ekzem werden dadurch immer häufiger festgestellt. Die periodischen oder chronischen Beschwerden durch die Allergie sind für den Betroffenen alles andere als harmlos, doch nicht nur für ihn selbst sondern auch sein Umfeld, wie etwa der Bereich Familie oder der Arbeitsplatz, der zur Lebenserleicheterung möglicherweise umgestaltet werden muß. Der Autor als besonders engagierter Praktiker und Grundlagenforscher hat in diesem kleinen Büchlein für jedermann verständlich die Herkunft der Allergien, die wichtigsten Allergene, ihr Vorkommen und was im Falle einer Allergie zu tun, ist beschrieben. Damit verbunden sind praktische Tips, die den Alltag des Allergiekranken erleichtern helfen. Zudem enthält diese verständliche Darstellung einen Katalog der ärztlichen Behandlungsmöglichkeiten zum Allergietyp und wichtige Hinweise, wo deren Möglichkeiten, Grenzen und Risiken liegen. Das Verzeichnis der verwendeteten Fachbegriffe faßt die Ausführungen übersichtlich zusammen.

E.-G. Burmeister

12. Schreiber, A. & J. Lehmann: Populationsgenetik im Artenschutz: Einführung mit Fallbeispielen für die Praxis.- Schriftenreihe der Landesanstalt für Ökologie, Bodenordnung und Forsten; Landesamt für Agrarordnung – Nordrhein-Westfalen, Bd. 14, 1997, 241 pp. ISBN 3-89174-027-1.

Populationsgenetik im Artenschutz genießt derzeit vermehrte Aufmerksamkeit insbesondere von Praktikern und Grundlagenforschern. Dabei wird nicht die Tradition von Zuchtwahl beim Besatz von jagdbaren Tieren umgesetzt, sondern die Erfahrungen von spezialisierten Methodikern bis hin zu Artenschützern, Tiergartenkuratoren und Züchtern beispielweise von Besatzfischen aus dem englisch-sprachigen Raum übernommen. Drei besondere Anreize für populationsgenetische Aspekte im Artenschutz kennzeichnen die Studienrichtungen: 1. Fortschritte der Molekulargenetik und vereinfachte Messungen genetischer Variabilität und Verwandtschaft; 2. Habitatfragmentierung führt zu einer Isolation von Wildtierbeständen und Verarmung des gen-pools; 3. Artenschutz, eingegrenzt durch vielfach unzureichende taxonomische Zuordnung, erzwingt populationsgenetische Untersuchungen. Der Taxonomie wird hier ungerechtfertigter Weise eine Unschärfe vorgeworfen, die eine Renaissance der zoologischen Systematik erzwingen soll, was der Historie widerspricht, da gerade diese Disziplin stets vor der unkritischen Verwendung von "Arten" ohne populationsökologischen Bezug gewarnt hat. Im Verlauf von zwei Seminaren, an denen sich besonders Verantwortliche von Naturschutz, Fischerei und Jagd beteiligten, wurde der Mangel dieser Fragestellung im Artenschutz deutlich. So werden hier die 16 Seminarbeiträge dieser Fachgruppe wie auch der Zoofachleute vorgestellt. Dieser Band ist eine überfällige Behandlung des Themas durch die Praktiker, von Biologen vielfach gefordert und offensichtlich überhört. Unbeantwortet bleibt dennoch die Frage: "Wo bleibt die Inzucht beim syrischen Goldhamster", weltweit Abkömmlinge eines trächtigen Weibchens!

E.-G. Burmeister

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On the taxonomy and biogeography of the Plusiinae of south-east Asia

(Insecta, Lepidoptera, Noctuidae, Plusiinae)

Gottfried Behounek and **László Ronkay**

Behounek, G. & L. Ronkay (1999): On the taxonomy and biogeography of the Plusiinae of south-east Asia (Insecta, Lepidoptera, Noctuidae, Plusiinae). – Spixiana **22/2:** 109-142

The present paper is a further contribution of the series dealing with new and little known taxa of Plusiinae from the South-East-Asian area. The descriptions of twelve new species and three new subspecies are given. New records of eighteen little known taxa are listed.

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Einleitung

Die vorliegende Arbeit ist ein weiterer Beitrag einer Serie, welche die Plusiinae-Fauna von Südost-Asien behandelt. Es werden zwölf neue Arten sowie drei neue Unterarten beschrieben. Von achtzehn weiteren, wenig bekannten Arten werden neue Fundortdaten angegeben.

1. Descriptions of new species and subspecies

Abrostola schintlmeisteri, spec. nov.

Plate 1, fig. 1, text-figs 1, 2

Types. Holotype: ♂, Philippines, N-Luzon, Ifugao, Banaue, vic 20 km nördl. Laguna, 1200 m, 16°54' nördl. Breite/121°06' östl. Länge, [Sekundärwald, Reisfelder], 22.9.-16.10.1988, leg. K. Cerny & A. Schintlmeister (coll. Behounek, coll. ZSM, Munich) (Slide No. 5082 ♂ Behounek). – Paratypes: 1♀, Philippines. N Luzon: Mts. Prov. Chatol, 15 km SE. Bontoc, 17°02' N, 121°02' E, [Nebelurwald], 1600 m, 24.9., 14.10.1988, leg. K. Cerny & A. Schintlmeister (coll. Behounek) (Slide No. 5113 ♀ Behounek); 1♂, with the same data (coll. Thöny, Poté, Brazil).

Diagnosis. The new species is a close relative of *A. suisharyonis* Strand, 1920, distributed in Taiwan and the southern Himalayan region (*A. s. robertsi* Dufay, 1971, known from India and from Nepal). The wing pattern of the two species is very similar but the forewing coloration of the new species is paler, the lower half of the cell and the marginal area are irrorated with ochreous-brownish, therefore the wing is less unicolorous, the plumbeous-greyish costal area is darker, the filling of the stigmata, especially of the orbicular is also paler than in *A. suisharyonis*.

The ♂ genitalia of the two species are similar in type but the harpae and the clavi of the new species are thicker, broader but somewhat shorter, the vesica contains a significantly higher amount of larger cornuti (*A. schintlmeisteri* has about thrice as many as *A. suisharyonis*).

Plate 1



Plate 2



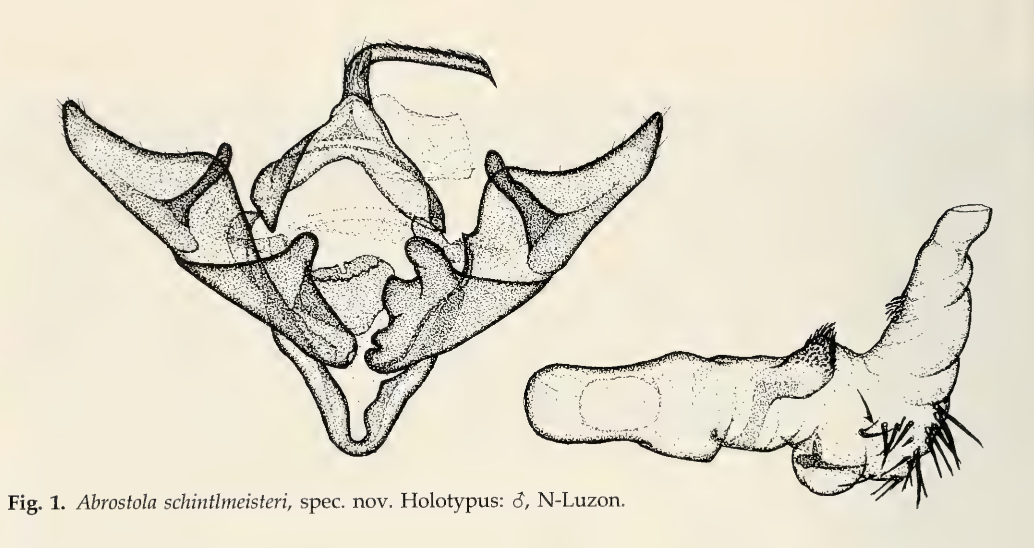


Fig. 1. *Abrostola schintlmeisteri*, spec. nov. Holotypus: ♂, N-Luzon.

◁ **Plate 1**

Fig. 1.	*Abrostola schintlmeisteri* sp.n.	Holotypus:	♂, N-Luzon,
Fig. 2.	*Chrysodeixis (Chrysodeixis) goergneri* sp.n.	Holotypus:	♂, Malaysia,
Fig. 3.	*Chrysodeixis (Chrysodeixis) keili* sp.n.	Holotypus:	♂, S-Thailand,
Fig. 4.	*Chrysodeixis (Chrysodeixis) keili* sp.n.	Paratypus:	♀, S-Thailand,
Fig. 5.	*Chrysodeixis (Chrysodeixis) similaris* sp.n.	Holotypus:	♂, N-Luzon,
Fig. 6.	*Chrysodeixis (Chrysodeixis) similis* sp.n.	Holotypus:	♂, N-Luzon,
Fig. 7.	*Chrysodeixis (Chrysodeixis) imitans* sp.n.	Holotypus:	♂, Flores,
Fig. 8.	*Chrysodeixis (Chrysodeixis) imitans* sp.n.	Paratypus:	♀, Sumbaea,
Fig. 9.	*Chrysodeixis (Chrysodeixis) permissa* (Walker, 1858)		♀, S-India
Fig. 10.	*Chrysodeixis (Chrysodeixis) dinawa* (Bethune-Baker, 1906)		♂, Ceram,
Fig. 11.	*Chrysodeixis (Chrysodeixis) dinawa* (Bethune-Baker, 1906)		♂, Irian Jaya,
Fig. 12.	*Chrysodeixis (Chrysodeixis) kebeana* (Bethune-Baker, 1906)		♂, Irian Jaya
Fig. 13.	*Ctenoplusia (Acanthoplusia) javana* sp.n.	Holotypus:	♂, Java,
Fig. 14.	*Chrysodeixis (Chrysodeixis) herbuloti* Dufay, 1982		♂, N-Luzon,
Fig. 15.	*Ctenoplusia (Ctenoplusia) placida sundicata* ssp.n.	Paratypus:	♂, Timor,
Fig. 16.	*Ctenoplusia (Ctenoplusia) placida sundicata* ssp.n.	Paratypus:	♂, Timor,
Fig. 17.	*Ctenoplusia (Ctenoplusia) sumbawana* sp.n.	Holotypus:	♂, Sumbawa,

Plate 2

Fig. 18.	*Chrysodeixis (Chrysodeixis) minutus* Dufay, 1970		♂, Taiwan
Fig. 19.	*Chrysodeixis (Chrysodeixis) kebea* (Bethune-Baker, 1906)		♂, Irian Jaya
Fig. 20.	*Chrysodeixis (Chrysodeixis) diehli* Dufay, 1982		♂, N-Nias,
Fig. 21.	*Chrysodeixis (Chrysodeixis) plesiostes* Dufay, 1982		♂, Flores,
Fig. 22.	*Chrysodeixis (Chrysodeixis) papuasiae* Dufay, 1970		♂, New Guinea,
Fig. 23.	*Chrysodeixis (Chrysodeixis) papuasiae* Dufay, 1970		♂, New Guinea,
Fig. 24.	*Chrysodeixis (Chrysodeixis) luzonensis* (Wileman & West; 1929)		♂, N-Luzon,
Fig. 25.	*Thysanoplusia reticulata* (Moore, 1882)		♂, Sumatra
Fig. 26.	*Thysanoplusia cernyi* sp.n.	Holotypus:	♂, N-Luzon,
Fig. 27.	*Thysanoplusia cernyi* sp.n.	Paratypus:	♀, N-Luzon,
Fig. 28.	*Thysanoplusia brechlini* sp.n.	Holotypus:	♂, Timor,
Fig. 29.	*Thysanoplusia brechlini* sp.n.	Paratypus:	♀, Flores,
Fig. 30.	*Ctenoplusia (Acanthoplusia) armata* sp.n.	Paratypus:	♂, Mindanao,
Fig. 31.	*Ctenoplusia (Acanthoplusia) armata* sp.n.	Holotypus:	♂, Mindanao,
Fig. 32.	*Ctenoplusia (Acanthoplusia) latistigma sulawesiana* ssp.n.	Holotypus:	♂, Flores
Fig. 33.	*Ctenoplusia (Acanthoplusia) latistigma floresiana* ssp.n.	Holotypus:	♂, Flores
Fig. 34.	*Ctenoplusia (Acanthoplusia) latistigma floresiana* ssp.n.	Paratypus:	♂, Flores
Fig. 35.	*Ctenoplusia (Acanthoplusia) dufayi* sp.n.	Paratypus:	♂, N-Luzon.

Comparing the ♀ genitalia of the two species, *A schintlmeisteri* has shorter, somewhat broader ostium bursae and larger but significantly weaker medial part of ductus bursae, without strongly sclerotized crests which present, well-developed in *A. suisharyonis*.



Fig. 2. *Abrostola schintlmeisteri*, spec. nov. Paratypus: ♀, N-Luzon.

Description

Wingspan 38 mm, length of forewing 17 mm. Head, collar and thorax dark brownish grey, mixed with blackish and a few ochreous; thoracic tufts very large, orange-ochreous marked with dark grey. Antennae of both sexes filiform. Abdomen dark brownish grey, dorsal crest strong, blackish. Forewing elongated, rather narrow triangular with apex pointed, outer margin evenly arcuate, finely crenate. Ground colour shining plumbeous grey, irrorated intensely with ochreous- or reddish brown in most parts of wing, costal area and cell suffused with blackish grey. Basal field covered with ochreous-reddish, marked with a few blackish scales. Ante- and postmedial crosslines rather distinct, slightly sinuous, partly double, blackish grey with reddish-brown definition, upper third of postmedial rather diffuse, represented by a red-brownish shadow. Medial area wide, orbicular and reniform stigmata relatively large, almost completely encircled with blackish, filled with paler grey, ochreous and a few dark grey scales. Subcellular stigma slightly larger than orbicular, rounded, marked with blackish and red-brown; claviform deleted. Subterminal a diffuse, sinuous, ochreous-whitish stripe, defined by three blackish apical streaks and a few indistinct, dark patches ("arrowheads"). Terminal line fine, continuous, blackish; cilia dark brownish grey spotted with ochreous-greyish. Hindwing shining whitish-ochreous, irrorated strongly with cupreous brown, marginal area wide, uniformly dark brown; veins covered with brown, discal spot present, rather pale, lunulate. Terminal line ochreous, cilia whitish with dark brown spots.

♂ genitalia (fig. 1). Uncus long, strong, curved at basal third, apex hooked. Tegumen low, broad, penicular lobes small. Fultura inferior (juxta) wide, cordiform, vinculum strong, V-shaped. Valvae almost symmetric, elongated, rather narrow with apex acute, costal lobe large, rounded. Sacculi short, strongly sclerotized, outer process of clavus somewhat bigger, thicker on right valva. Harpae wide-based, long, more or less flattened, apically slightly curved, somewhat stronger on right valva. Aedeagus short, thick, carina with a well-developed, terminally strongly spinose dorso-lateral plate. Vesica broadly tubular, basal half inflated, with a globular diverticulum and a digitiform, strong bar, frontal surface with numerous (about twenty) long, acute spines, distal half tapering, inner curve with a small cornuti field consisting of short spinules.

♀ genitalia (fig. 2). Ovipositor strong, relatively short, papillae anales sclerotized, setose, gonapophyses rather short. Ostium bursae sclerotized, more or less quadrangular with more or less rounded lateral lobes on both sides. Terminal part of ductus bursae tubular, rather narrow, medial part dilated, discoidal, wrinkled, granulose, proximal part tapering, rugulose. Cervix bursae small, semiglobular, finely granulose, corpus bursae long, constricted at middle, fundus somewhat broader, rounded.

Bionomics and distribution. *A. schintlmeisteri* occur the higher mountains of the Island Luzon. First record of the genus *Abrostola* southwards of the Asian mainland.

Etymology. The new species is dedicated to Dr. Alexander Schintlmeister.

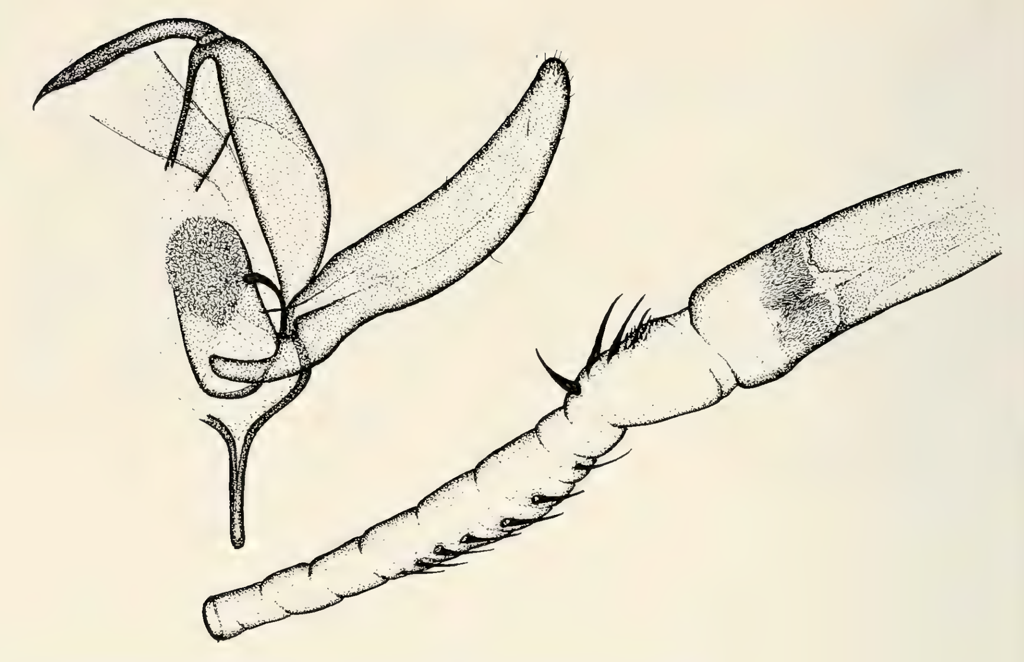


Fig. 3. *Chrysodeixis (Chrysodeixis) goergneri*, spec. nov. Holotypus: ♂, Malaysia.

Chrysodeixis (Chrysodeixis) goergneri, spec. nov.

Plate 1, fig. 2, text-fig. 3

Types. Holotype: ♂, "Malaysia, Perak-Prov., 8 km NNE Jelei, 17.1.1994, leg. Görgner" (coll. MNKV, Dessau) (Slide No. 5177 Behounek). – Paratypes: 1♂, Malaysia. Selangor, Ulu Gombak, 30 km nördl. Kuala Lumpur, 22. Feb. 1984, leg. Nässig (coll. Behounek); 8♂♂, Perak, 8 km NNE Jelei, 17.1.1994, leg. Görgner (coll. MNKV, Dessau); 1♂, with the same data (coll. Behounek) (Slide Nos. HS073, 5193 Behounek, ♂♂).

Diagnosis. The new species is closely related to *C. diehli* Dufay, 1982, *D. chrysopepla* Ronkay, 1989, *C. dinawa* (Bethune-Baker, 1906) and *C. plesiostes* Dufay, 1982, these taxa are regularly hardly separable by the external features, the examination of the genitalia is required for the satisfactory identification.

The ♂ genitalia differ from those of *C. diehli* and *D. chrysopepla* by the medially broadened, apically more elongated, pointed valva, resembling more to that of *C. plesiostes*, the shorter clavus and the stronger, larger cornuti of the vesica; from those of *C. plesiostes* by the stronger, thicker, more curved cornuti, forming a shorter row in the medial tube of the vesica. The ♂ genitalia of *C. dinawa*, the fifth species of the group, differ relatively strongly from those of the other species by its larger, apically less tapering valvae with more rounded apex and the basal bulb of the vesica is covered with a great amount of short spiculi.

Description

Wingspan 25-26 mm, length of forewing 11-12 mm. Head and thorax pale brownish white, fronts covered with whitish-ochreous hairs, sides of palpi dark brown. Antenna of ♂ thin, long, filiform. Tegulae rather distinct, marked with ochreous-brown, metathoracic tuft large, ochreous-brownish. Forewing rather short, high triangular with apex pointed, outer margin with a slight medial angle. Ground colour pale whitish grey with intense metallic golden brilliance, irrorated with ochreous brown, especially below cell. Basal area almost uniformly whitish, marked with a blackish spot, antemedial line double, whitish and brown, straight below cell. Medial area relatively wide, upper part darkened, grey-brown, darkest part of wing; lower part shining golden-ochreous. Orbicular stigma flattened, small, reniform larger, narrow, incompletely encircled with dark grey, filled with paler grey. Stigma small, silvery, separated into a small, oblique U-mark and a more or less rounded spot.

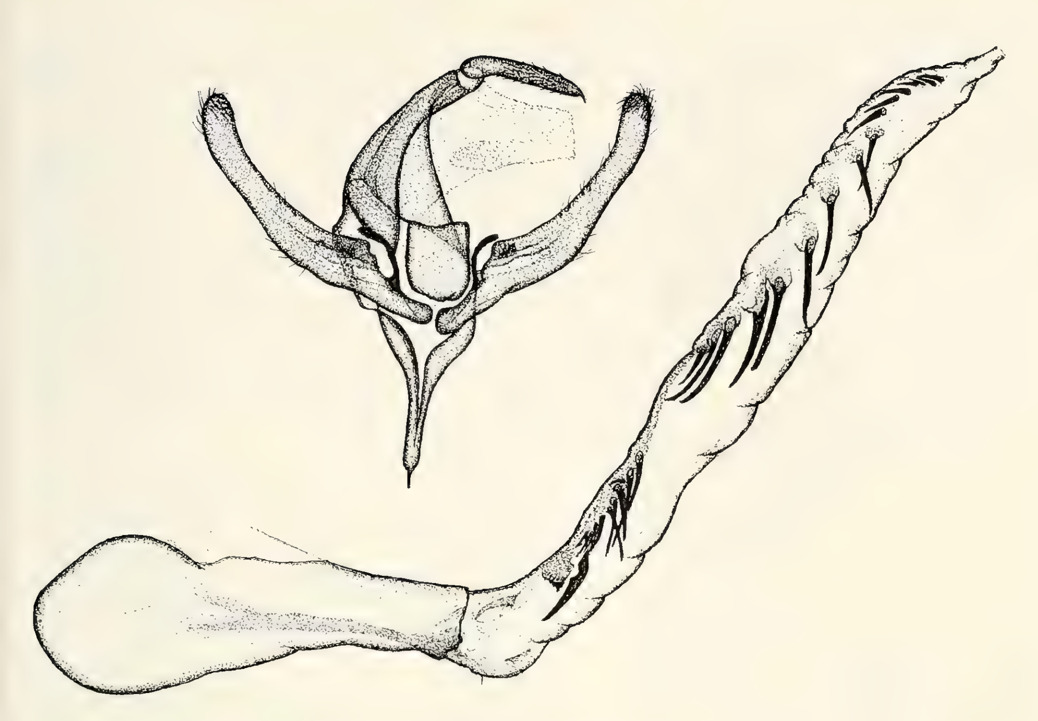


Fig. 4. *Chrysodeixis (Chrysodeixis) keili*, spec. nov. Holotypus: ♂, S-Thailand.

Postmedial line double, almost straight, slightly sinuous, angled inwards below stigma; darker brown filled with whitish grey. Subterminal obsolescent, strongly waved, defined by a darker apical patch and a slightly darker inner stripe. Terminal line brown, defined by a pinkish white line and a few blackish dots. Cilia whitish, spotted with pale brown and a conspicuous black spot at vein m3. Hindwing ochreous brown, veins covered with darker brown, inner area with weaker, marginal field with intense dark brown suffusion. Discal spot obsolescent, transverse line stronger, well-discernible; cilia whitish with a few small brownish spots. Underside of wings whitish-ochreous with strong, dark brown irroration in medial areas of both wings, transverse lines present, discal spots pale.

♂ genitalia (fig. 3). Uncus long, almost straight, only slightly curved at base, apex with long, flat hook. Tegumen high, narrow, fultura inferior subrectangular, rather high, vinculum fine, medium-long, constricted below saccular margin. Valva elongated, medially dilated with arcuate ventral margin, apex long, pointed. Clavus medium-long, apically dilated, setose, harpe reduced. Aedeagus long, cylindrical, with a sclerotized, distally bifurcated ventral sclerotized ribbon. Vesica tubular, basal part somewhat broader, armed with a few minute spines and 3-4 large, strong, curved cornuti, medial part with a row of 6-7 rather strong, wide-based, curved spines.

Distribution. This species is only known from Malaysia

Etymology. The new species is dedicated to Dr. E. Görgner.

Chrysodeixis (Chrysodeixis) keili, spec. nov.

Plate 1, figs 3, 4, text-figs 4, 5

Types. Holotype: ♂, "S-Thailand, Khao Lak-Nationalpark, 100 km nördl. Phuket, 0-50 m, 5.-16.1.1993, leg. Keil" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5026 Behounek). – **Paratype:** 1♀, Thailand, Khao Lak, Nang Tong Bay, Resort II, 17-20.11.1997, leg. Keller (coll. HNHM, Budapest) (Slide No. RL6117, ♀).

Diagnosis. The new species is similar externally to *C. chalcites* (Esper, 1789) and *C. eriosoma* (Doubleday, 1842) but the forewing pattern is less distinct, the ante- and postmedial crosslines, especially the

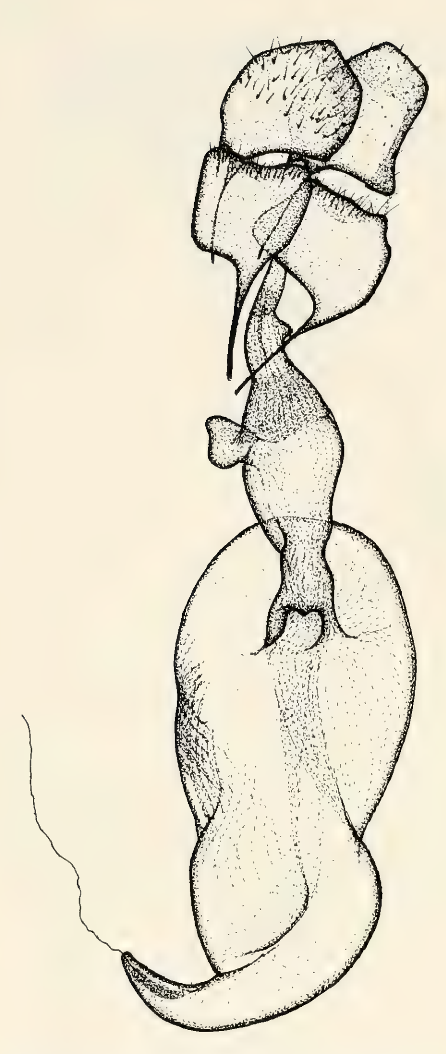


Fig. 5. *Chrysodeixis (Chrysodeixis) keili*, spec. nov. Paratypus: ♀, S-Thailand.

upper part of the antemedial line are more diffuse, paler, the hindwing is also paler, more ochreous with less darkened marginal suffusion.

The ♂ genitalia differ from the related two species by its somewhat longer, apically slightly dilated valvae with less expressed ventral angle, significantly shorter vinculum and different armature of vesica. *C. keili* has the basal cornuti stronger, the first items of the medial row much shorter, weaker than those of *C. chalcites* and *C. eriosoma*, the total amount of the cornuti is larger in the new species. The third related species, *C. illuminata* Robinson, 1968 has the valvae much broader, apically less tapering, the armature of vesica reduced to a few subbasal spines and a remote terminal cornutus.

The ♀ genitalia are very similar to those of *C. chalcites* and *C. eriosoma*, differing from the former by its shorter, broader ductus bursae, from the latter by its less sclerotized proximal part of ductus bursae, lacking the stronger sclerotized crests present in *C. eriosoma*, the sclerotized patch of the corpus bursae is also smaller, weaker.

Description

Wingspan 34 mm, length of forewing 16 mm. Head and thorax dark red-brown mixed with orange-ochreous and violet, tip of collar, tegulae and metathoracic tuft marked with whitish. Abdomen ochreous, dorsal crest strong, blackish-brown. Forewing elongated, relatively high with apex pointed, ground colour pale ochreous brown with intense metallic golden-bronze brilliance, variegated with pale violet-grey, red-brown and a few blackish and whitish. Basal area narrow, suffused with pinkish-violet grey, subbasal streak represented by a rounded dark patch. Antemedial line oblique, slightly sinuous, rather indistinct, marked with pinkish white. Medial area broad, upper part suffused with dark grey-brown, darkest part of wing, lower half red-brownish with golden shining. Orbicular and reniform stigmata small, former flattened, encircled with pinkish white, filled with greyish, latter narrow, constricted at middle, encircled with blackish, dark grey and bronze-brown. Stigma large, golden-silvery, separated into two parts, inner spot slightly smaller, more or less V-shaped, outer spot rounded, stigma surrounded by a dark brown patch with reddish-bronze iridescence. Postmedial line rather indistinct, sinuous, double, diffuse, defined with a violet-greyish stripe. Subterminal line sinuous, defined by a darker inner zone. Terminal line interrupted, brownish followed by a thin whitish line, cilia ochreous white, spotted with dark brown. Hindwing pale ochreous-brownish, marginal suffusion strong, dark brown, veins also brownish; cilia ochreous-whitish with brownish spots. Underside of wings ochreous-whitish, forewing and costal area and outer half of hindwing suffused strongly with dark brown, traces of stigma clearly visible, discal spot of hindwing diffuse.

♂ genitalia (fig. 4). Genital capsula strongly sclerotized, simplified, rather small, aedeagus almost as long, thick. Uncus short, straight, strong, apically hooked, tegumen medium-high, narrow, fultura inferior large, slightly rounded quadrangular, vinculum shorter than tegumen, narrowly V-shaped. Valva short, narrow, arcuate, distally tapering, apical part finely dilated with apex rounded, setose. Sacculus short, narrow, clavus medium-long, curved, apically dilated, having sensory setae. Pulvillus



Fig. 6. *Chrysodeixis (Chrysodeixis) similaris*, spec. nov. Paratypus: ♂, N-Luzon.

short, setose, harpe reduced. Aedeagus cylindrical, ventral sclerotized lamina short, relatively weak. Vesica long, broadly tubular with a fine sclerotized bar running along tube of vesica. Basal part with two larger cornuti, a small bundle of short spinules and a short row of longer, acute spines. Distal half armed with a long row of wide-based cornuti, longest items situated at middle of this row, terminal part with short, strong thorns.

♀ genitalia (fig. 5). Ovipositor short, weak, gonapophyses short, fine. Ostium bursae membranous, with a collar-like proximal sclerotized zone and a small, gelatinous, finger-like lateral appendix. Ductus bursae rather short, medially broadened, gelatinous-hyaline, proximal part constricted, hyaline with fine scobination, without sclerotized crests or ribs. Corpus bursae elongated-saccate, most parts membranous with fine scobination; with a rather large medio-lateral sclerotized plate with stronger crests. Cervix bursae small, hyaline, falciform, situated at proximal end of bursa copulatrix.

Bionomics and distribution. This species is only known from the lowland of South Thailand.

Etymology. The new species is dedicated to Mr. Norbert Keil.

Chrysodeixis (Chrysodeixis) similaris, spec. nov.

Plate 1 fig. 5, text-figs 6, 7

Types. Holotype: ♂, "Philippines, Ifugao, Banaue, 20 km N Lagawe, 1200 m, 16°45'E, 121°05'E, 8-12.02.1988, leg. Cerny" (HNHM Budapest) (slide No. RL3216). – Paratypes: 1♂, Philippines. N Luzon, with same data as the holotype; 3♂♂, 1♀, from the same locality, 22.09-16.10.1988, leg. Cerny & Schintlmeister; 1♂, Prov. Ifugao, Kinakin, 5 km E Banaue, 1200 m, 21.07.1993, leg. Michael Schaarschmidt; 1♂, from the same locality, 5.8.1993, leg. Mario Graul (coll. Behounek and HNHM) (Slide Nos. RL3151, RL4780, RL4781, RL4782, RL4789, RL4800, ♂♂, RL4801, ♀).

Diagnosis. The new species belongs to the *C. minutus* species-group consisting of seven, externally more or less similar, often hardly distinguishable species, *C. minutus* Dufay, 1970, *C. minutoides* Holloway, 1985, *C. politus* Dufay, 1970 and two newly discovered ones, *C. similis*, spec. nov. and *C. similaris*, spec. nov. The two other taxa, *C. papuasiae* Dufay, 1970, *C. imitans*, spec. nov., resembling also to *C. luzonensis* (Wileman et West, 1929), and *C. taiwani* Dufay, 1974, show also closer connections with this group by the features of the ♂ genitalia.

C. similaris is confusingly similar in appearance to *C. minutus*, *C. similis* and *C. minutoides*, the satisfactory identification requires the study of the genitalia. *C. politus* and *C. imitans* are generally

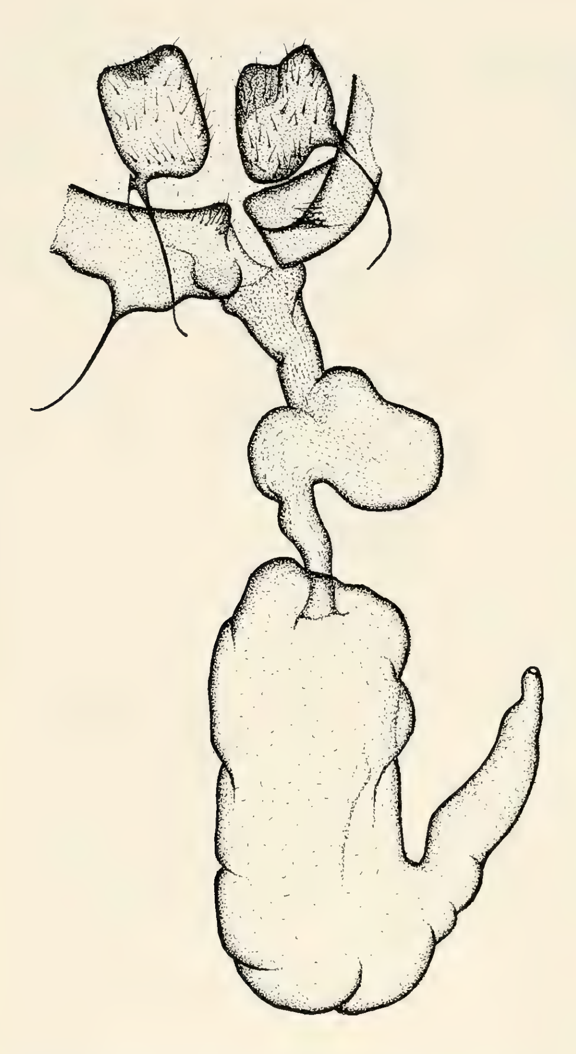


Fig. 7. *Chrysodeixis (Chrysodeixis) similaris*, spec. nov. Paratypus: ♀, N-Luzon.

larger in size with stronger body and longer, more pointed, more glossy forewings with more contrast pattern, larger stigma, its outer spot is conspicuously large, rounded, etc.

The ♂ genitalia of the related species differ often surprisingly strongly, the species are easily recognisable by their genital characteristics. *C. similaris* differs from *C. minutus* and *C. similis* by its significantly longer, narrower, more arcuate valva and the much larger amount of cornuti of the vesica of variable shape and size, from *C. similis* also by its much narrower uncus, from *C. minutoides* by its longer uncus, much longer, basally not angled valva and shorter vesica with much more complex armature of cornuti, from *C. papuasiae* by its narrower uncus, longer, arcuate valva, shorter vesica with generally smaller cornuti with the exception of the last two items and by the lack of the terminal small cornuti field. C. politus differ from all related species by its very long, tubular vesica covered with minute spiculi, armed with a medium-long, pin-like terminal cornutus.

The ♀ genitalia of *C. similaris* differ from those of *C. minutus* by its significantly longer ductus bursae with larger, more inflated discoidal part, the corpus bursae is somewhat smaller, from *C. politus* by its much shorter, less scobinate ductus bursae, larger corpus bursae with smaller, shorter cervical part.

Description

Wingspan 30-31 mm, length of forewing 14-15 mm. Head and thorax dark chocolate-brown, tip of collar, tegulae and metathoracic tuft finely marked with whitish. Abdomen ochreous, dorsal crest strong, blackish-brown, anal tuft large, blackish. Forewing elongated, narrow with apex pointed, ground colour deep chocolate-brown with intense metallic golden-bronze shining, basal field, cell and costal area around postmedial line suffused with violet-grey. Basal area narrow, subbasal line fine, straight, silvery, subbasal streak a short, blackish patch. Ante- and postmedial lines slightly sinuous, silvery-whitish and dark brown, former oblique, latter strongly angled inwards below stigma. Orbicular and reniform stigmata less defined, small, former encircled with pinkish white, filled with greyish, latter narrow, obsolescent. Stigma small, silvery, separated into two parts, inner spot a minute V, outer spot larger, rounded. Subterminal line obsolescent, interrupted, sinuous, whitish, outer part of marginal area with weak whitish irroration. Terminal line a row of tiny dark triangles followed by a fine violet-whitish line, cilia pale violet-greyish, spotted with dark brown. Hindwing ochreous-whitish, inner half irrorated, marginal area strongly suffused with dark brown, veins also brownish, discal spot absent or very pale; cilia ochreous with brownish spots. Underside of wings ochreous-whitish, forewing and costal area and outer half of hindwing suffused strongly with dark brown, marginal fields irrorated also with some greyish. Traces of stigma clearly visible, discal spot of hindwing diffuse.

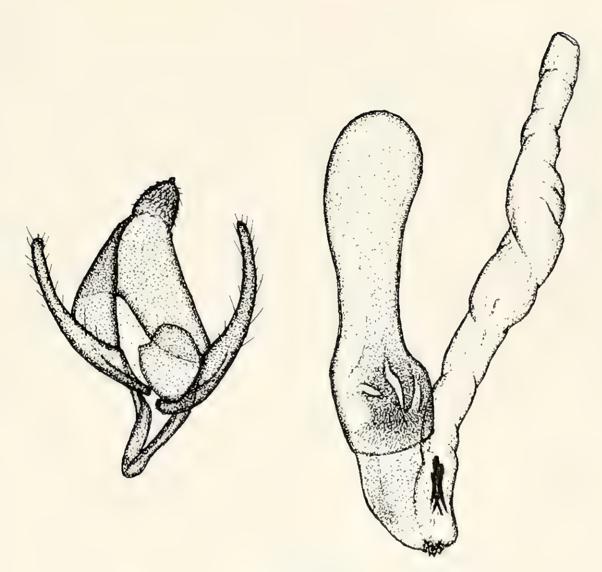


Fig. 8. *Chrysodeixis (Chrysodeixis) similis*, spec. nov. Holotypus: ♂, N-Luzon.

♂ genitalia (fig. 6). Genital capsula sclerotized, simplified, rather small, smaller than aedeagus. Uncus short, narrow, apical hook fine, tegumen medium-high, fultura inferior large, elliptical with stronger small ventral plate, vinculum slightly shorter than tegumen, fine, V-shaped. Valva long, very narrow, arcuate, apically slightly dilated with apex rounded, setose. Sacculus short, narrow, clavus and harpe reduced. Aedeagus long, thick, ventral sclerotized bar strong. Vesica relatively short, tubular, distal half partly coiling. Basal third with a dentated dorsal plate continuing in medial part in a coiling row of spinules being increasingly larger terminad, last some, large cornuti sitting on small, subconical diverticula, distal third has no cornuti.

♀ genitalia (fig. 7). Ovipositor short, weak, posterior papillae anales more or less rectangular; gonapophyses fine. Ostium bursae membranous, ductus bursae long, posterior and anterior thirds narrow, tubular, membranous with fine wrinkles, medial third strongly dilated. coiled forming a flattened, gelatinous, strongly wrinkled disc. Bursa elongated-elliptical, finely scobinate with some long, prominent folds, cervical part originating from fundus, long, narrow.

Bionomics and distribution. The species is known from Luzon, found in forest areas at medium high altitudes.

Etymology. The specific name refers to the high similarity with the other members of the *C. minutus* species-group.

Chrysodeixis (Chrysodeixis) similis, spec. nov.
Plate 1, fig. 6, text-fig. 8

Holotype: ♂, "Philippines, N-Luzon, Ifugao, Mt. Pilis, 2000 m, 16 km SSE Bontoc, 23.9.1988, leg. Cerny & Schintlmeister" (coll. Behounek, coll. ZSM, Munich) (Slide No. 4287 Behounek).

Diagnosis. The ♂ genitalia of *C. similis* differ from *C. minutus* and *C. papuasiae* by its much broader, shorter uncus, narrower, apically more tapering valva and the reduced armature of the vesica consisting only from four longer spines and a small field of small spiculi at its basal part; from *C. minutoides* by its conspicuously broader uncus, longer, basally not angled valva and shorter vesica without large subbasal cornutus but with a small field of denticles basally. The differences between *C. similis* and *C. similaris* are discussed in the diagnosis of *C. similaris*.

Description

Wingspan 29 mm, length of forewing 13 mm. Head and thorax dark brown, mixed with reddish-brown, tip of collar, tegulae and metathoracic tuft finely marked with pink and with whitish. Forewing narrow, with apex pointed, ground colour deep chocolate-brown with reddish shade and with strong bronze iridescence; basal area pinkish, cell and costal area suffused with violet-grey, outer half of marginal area deep bronze-reddish. Subbasal line fine, straight, silvery, subbasal streak represented by a blackish dot. Antemedial line oblique, straight below cell, postmedial line slightly sinuous, strongly angled inwards below stigma, both crosslines dark brown filled with silvery-whitish. Orbicular stigma small , flattened, encircled with pinkish white, filled with greyish, reniform stigma less defined, narrow, obsolescent, marked with blackish spots and lines. Stigma small, silvery, separated into two parts, inner spot a minute V, outer spot somewhat larger, rounded. Subterminal line obsolescent, interrupted, sinuous, whitish, terminal line a row of tiny dark triangles followed by a fine violet-whitish line. Cilia violet-grey, spotted with darker brown. Hindwing ochreous-whitish, inner half irrorated, broad marginal area strongly suffused with cupreous brown. Veins covered with brown, discal spot obsolete; cilia whitish-ochreous, spotted with brownish.

♂ genitalia (fig. 8). Genital capsula sclerotized, simplified, rather small, smaller than aedeagus. Uncus short, broad, flattened, apical hook fine, tegumen medium-high, fultura inferior large, elliptical, vinculum considerably shorter than tegumen, V-shaped. Valva elongated, narrow, arcuate, apically tapering with apex finely rounded, setose. Sacculus short, narrow, clavus and harpe reduced. Aedeagus long, thick, ventral sclerotized bar strong. Vesica relatively short, tubular, basal third with a small field of short spiculi and four longer spines.

♀ unknown.

Bionomics and distribution. Philippines, Luzon.

Etymology. The specific name refers to the high similarity with the other members of the *C. minutus* species-group.

Chrysodeixis (Chrysodeixis) imitans, spec. nov.

Plate 1, figs 7, 8, text-fig. 9

Types. Holotype: ♂, "Indonesia, Flores, Prov. Nusa Tenggara Timur Gunung, etc., 9 km E Rutang, 1140 m, 14-15.IV.1996, leg. Brechlin" (HNHM, Budapest) (Slide No. RL5761). – Paratypes: 8♂♂, Indonesia. Sumbawa, Prov. Nusa Tenggara Barat, Gunung (=Mt.) Tambora (W) 10 km E Tambora, 1020 m, primary forest, 14-15.3.1996, leg. R. Brechlin; 2♂♂, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (N) 9 km E Rutang, 1140 m, secondary-primary forest, 14-15.4.1996, leg. R. Brechlin; 1♂, Prov. Nusa Tenggara Timur Gunung (=Mt.) 3 km S Mano, (18 km SE Rutang) 1270 m, primary forest, 17-21.4.1996, leg. R. Brechlin (colls. Behounek, HNHM, Budapest, and Krusek) (Slide Nos. 5211, 5212, 5237, Behounek, RL6118, RL6119, ♂♂).

Diagnosis. The new species is externally very similar to *C. papuasiae*, differing only by its somewhat narrower, longer, slightly darker, more variegated forewings with less intense golden brilliance, somewhat stronger whitish irroration in the basal area and the upper third of the postmedial line is more straight, less sinuous. In spite of this high external similarity, the ♂ genitalia of *C. imitans* differ conspicuously from those of *C. papuasiae* by its longer uncus, narrower, longer valva with parallel margins and the much longer, broadly tubular vesica armed with a row of tiny denticles near at base and a long, pin-like terminal cornutus; from *C. luzonensis* by its much shorter uncus and valva, the lack of the harpe and the longer vesica having pin-like terminal cornutus but lacking the long subbasal stripe of minute spiculi.

The size, the wing shape and the ♂ genitalia of *C. imitans*, spec. nov. are very close to those of *C. politus* but the wing pattern is much more variegated, especially in basal, costal and marginal fields, the pale violet-greyish areas are reduced, less homogeneous, the golden brilliance is more intense. In the ♂ genitalia the uncus and the valva of the new species are somewhat longer, latter with more parallel margins from base to tip; the configuration of the vesica is surprisingly similar in the two closely related taxa.

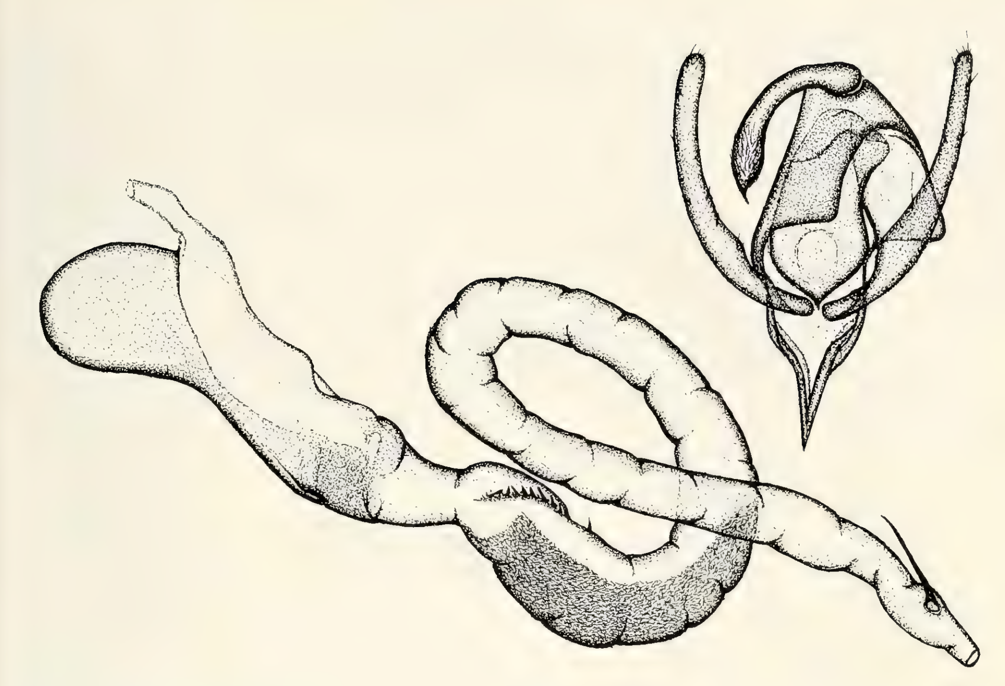


Fig. 9. *Chrysodeixis (Chrysodeixis) imitans*, spec. nov. Paratypus: ♂, Flores.

Description

Wingspan 31 mm, length of forewing 15 mm. Head and thorax dark chocolate-brown, tip of collar, tegulae and metathoracic tuft marked with whitish. Abdomen ochreous, dorsal crest strong, blackish-brown. Forewing elongated, relatively high with apex pointed, ground colour dark brown with intense metallic golden-bronze brilliance, variegated with dark grey, blackish and whitish. Basal area narrow, suffused with pinkish white, subbasal streak a short, dark patch. Antemedial line oblique, slightly sinuous, marked with pinkish white. Medial area broad, orbicular and reniform stigmata small, former encircled with pinkish white, filled with greyish, latter narrow, constricted at middle, encircled with a fine whitish line, marked with blackish and bronze-brown. Stigma large, golden-silvery, separated into two parts, inner spot slightly smaller, more or less V-shaped, filled, outer spot large, rounded, stigma surrounded by a dark brown patch with violet-bronze iridescence. Postmedial line strongly sinuous, double, defined with whitish, deeply angled inwards below stigma. Subterminal line sinuous, whitish, outer part of marginal area irrorated with whitish. Terminal line a row of tiny dark triangles followed by small white arches, cilia pinkish white, spotted with dark brown. Hindwing ochreous-whitish, marginal area broad, suffused with dark brown, veins also brownish; cilia ochreous with brownish spots. Underside of wings ochreous-whitish, forewing and costal area and outer half of hindwing suffused strongly with dark brown, traces of stigma clearly visible, discal spot of hindwing diffuse.

♂ genitalia (fig. 9). Genital capsula simplified, rather small, smaller than aedeagus. Uncus medium-long, thick, apically finely hooked, tegumen low, fultura inferior large, elliptical, vinculum short, V-shaped. Valva elongated, narrow, arcuate, its margins almost parallel from base to tip. Sacculus short, narrow, clavus and harpe reduced. Aedeagus long, thick, ventral sclerotized bar strong. Vesica very long, broadly tubular, basal area with a short row of small denticles, medial third covered partly with minute spiculi, terminal part with a long, pin-like cornutus.

♀ unknown.

Bionomics and distribution. Flores, Sumbawa.

Etymology. The specific name refers to the high similarity of the genitalia of the new species compared with those of *C. politus*, in spite of the rather conspicuous differences in their external appearance.



Fig. 10. *Thysanoplusia cernyi*, spec. nov. Holotypus: ♂, N-Luzon.

Thysanoplusia cernyi, spec. nov.

Plate 2, figs 26, 27, text-figs 10, 11

Types. Holotype: ♂, "Philippines, N-Luzon, Mts. Prov. Chatol, 15 km südöstl. Bontoc, 17°02' nördl. Breite/ 121°02' östl. Länge, [Nebelurwald], 1600 m, 24.9., 14.10.1988, leg. K. Cerny & A. Schintlmeister" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5110 m Behounek). – Paratypes: 1♀, Philippines, Luzon, Mts. Prov., Mt. Data, 2250 m, 50 km SW Bontoc, 16°52' N, 120°50' E, ["Nebelwald", Pinus plantation.], 13.10.1988, leg. K. Cerny & A. Schintlmeister (coll. Behounek); 7♂♂, Prov. Bontoc, Chatol, 15 km E Bontoc 1800 m, 23.07.1993, leg. M. Graul (colls. Behounek, Krusek, Graul, HNHM Bp.); 5♂♂, Prov. Ifugao, Mt. Polis, 20 km N Banaue, 1600 m, 26-31.07.1993, leg. M. Graul (colls. Behounek, Graul, HNHM, Budapest); 3♂♂, 3♀♀, Prov. Bontoc, Mt.Data Hotel, 10 km E Bontoc 1900 m, 02.08.1993, leg. M. Graul (colls. Behounek, Graul, HNHM, Budapest) (Slide Nos. 5220 Behounek, RL4784, RL4785 Ronkay, ♂♂, 5110, 5217 Behounek, RL4471, RL4785 Ronkay, ♀♀).

Diagnosis. The *Thysanoplusia intermixta*-group has been revised by Behounek and Ronkay (1996). The newly elaborated material from the Sundaland revealed a much stronger fragmentation of the species-group than it was supposed earlier, there are further, formerly unknown species of the group occurring in Luzon (*T. cernyi*, spec. nov.) and in Flores and Timor (*T. brechlini*, spec. nov.). On the other hand, *T. aureopicta* Behounek and Ronkay, 1996 represents probably also two species as the typical populations from New Guinea and its closer islands differ from the larger series of specimens found in N Luzon.

Externally *T. cernyi* differs from the related taxa by the shape and size of the golden area. This area is clean, sharply finished at the first anal vein, its margin being parallel with inner margin, does not extending towards to tornal part of the wing, like in *T. aureopicta* (s. l) and *T. brechlini*. The golden area of *T. intermixta* has terminated also at the first anal vein but its margin is not so sharply defined, the inner extension is shorter, broader, directed more obliquely towards the cell.

The ♂ genitalia of *T. cernyi* differ from the related species by its simple, rather short terminal cornutus of the vesica, in addition, the basal, spiculiferous part is shorter, less than half of the total

length of the vesica (this latter feature is common with *T. brechlini*). The genital capsula of the new species resembles mostly to that of *T. intermixta*, but the vinculum is less splayed, the cucullus is less dilated and the harpe is somewhat longer, stronger. The vinculum is less splayed than that of *T. aureopicta,* without concave tip, the valva is narrower, more elongated, the clavus is somewhat longer, the harpe is finer.

The ♀ genitalia of *T. cernyi* is most similar to those of *T. intermixta* but the ductus bursae is longer with the proximal end less twisted, the sclerotized plate is considerably longer, stronger. The ductus bursae of *T. aureopicta* is similarly long but its proximal end is practically not twisted and the sclerotized plate is reduced.

The comparison of the genitalia of *T. cernyi* and *T. brechlini* is given in the diagnosis *of T. brechlini.*

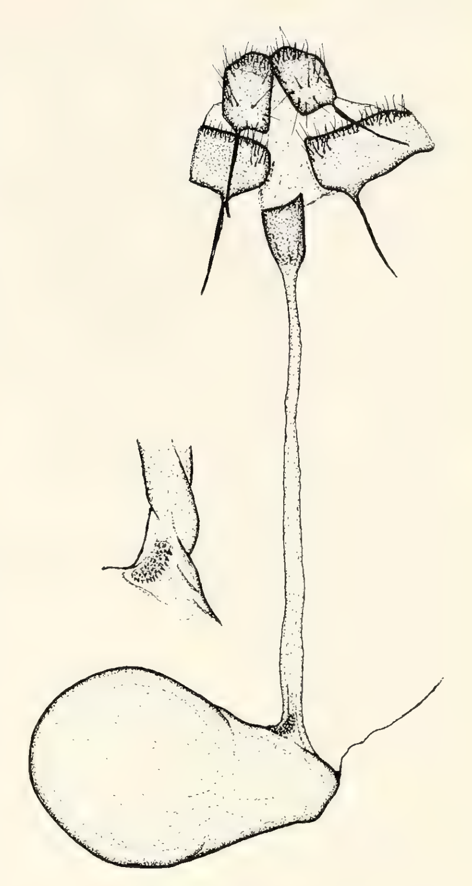


Fig. 11. *Thysanoplusia cernyi*, spec. nov. Paratypus: ♀, N-Luzon.

Description

Wingspan 33-34 mm, length of forewing 16-17 mm. Head, collar and prothoracic tuft orange-reddish, tegulae and metathorax dark violaceous red-brown mixed with whitish. Abdomen ochreous mixed with reddish-brown, dorsal crest blackish and red-brown, anal tuft dark red-brown and yellow. Forewing elongated, rather high with apex acute, ground colour deep, shining red-brown with violaceous shade and fine dark reticulation. Basal and antemedial crosslines obsolete, sinuous, orbicular stigma small, flattened, reniform narrow, medially constricted, their outlines pale greyish. Stigma more or less quadrangular, brilliant golden, fused with large golden patch of marginal area forming a long, narrow stripe parallel with vein an1. Postmedial line dark brown marked with violaceous grey, angled inwards below cell then outwards at vein an1. Metallic patch of marginal area brilliant golden-yellow, weakly reticulate with red-brown and violaceous, its lower edge sharp, terminated at vein an1. Subterminal strongly sinuous, red-brow, regularly clearly visible. Terminal line dark brown marked with orange-brownish, cilia as ground colour, with darker brown inner line and with a few dark spots. Hindwing pale ochreous, veins and broad marginal area suffused with cupreous brown, discal spot and transverse line diffuse. Terminal line brown, cilia ochreous with darker inner line.

♂ genitalia (fig. 10). Uncus long, slender, curved, apically hooked, tegumen broad, relatively low, fultura inferior rather high, rounded, vinculum long with apical part (saccus) broadened, more or less triangular. Valva very long with more or less parallel margins, slightly tapering at medial third, cucullus slightly dilated with apex rounded, corona represented by a larger, setose field. Sacculus short, sclerotized, clavus long, slender, somewhat longer than harpe. Harpe rather strong, straight, stick-like. Aedeagus cylindrical with globular basal bulb, ventral sclerotized plate long, fine, carina with a fine, long, terminally dentated bar. Vesica tubular, narrow, slightly inflated at base, basal half covered densely with minute spiculi, terminal cornutus simple, rather short, acute, slightly curved.

♀ genitalia (fig. 11). Ovipositor rather large, weakly sclerotized, papillae anales rounded quadrangular, gonapophyses slender. Ostium bursae elongated-calyculate, finely scobinate, ductus bursae very long, narrowly tubular, membranous with only very poor granulation, its anterior end twisted, bearing an elongated, dentated, sclerotized plate at junction to bursa copulatrix. Corpus bursae ovoid, cervix bursae small, conical, both membranous with very weak granulation.

Bionomics and distribution. Philippines, Luzon.

Etymology. The new species is dedicated to Dr Karel Cerny.

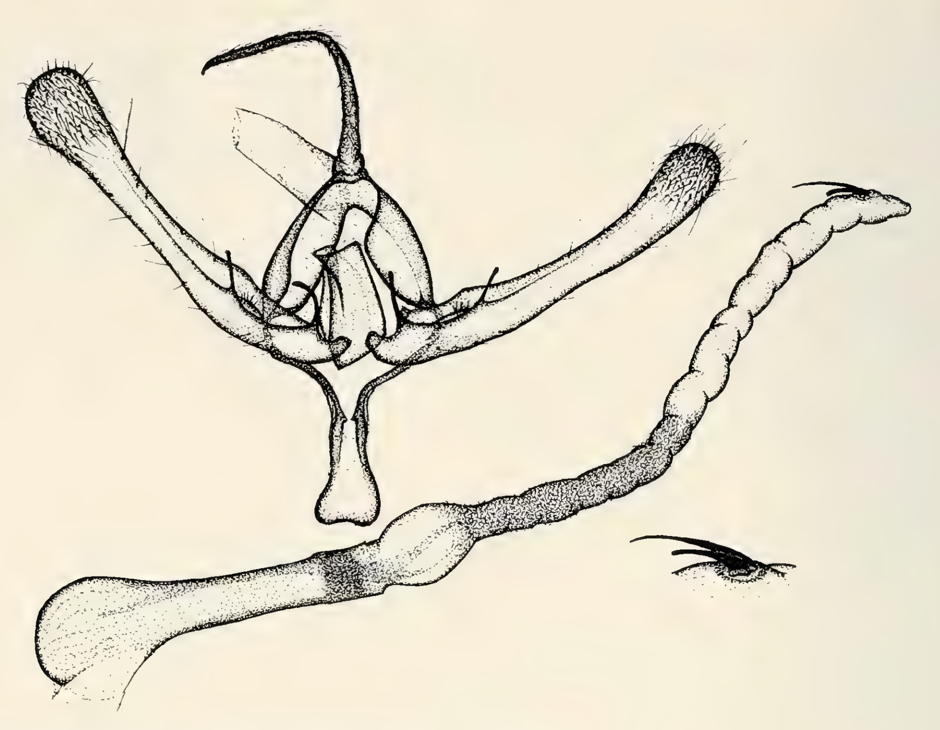


Fig. 12. *Thysanoplusia brechlini*, spec. nov. Holotypus: ♂, Timor.

Thysanoplusia brechlini, spec. nov.

Plate 2, figs 28, 29, text-figs 12, 13

Types. Holotype: ♂, "Indonesia, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (N) 9km E Rutang, 1140 m Sec.-Prim. forest, 14.-15.4.1996, leg. R. Brechlin" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5216 Behounek). – Paratypes: 1♂, Indonesia. Flores, with same data as holotype; 7 ex., Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17-21.4.1996 leg. R. Brechlin (coll. Behounek); 17 ex., Timor, Barat, Prov. Nusa Tenggara Timur, Gunung (Mt.) Mutis (S) 1460 m, Fatumnasi, 21.-23.3.1996, leg. R. Brechlin; 10 ex., Timor, Prov. Nusa Tenggara Timur, Gunung (5 km N Fatumnasi, 1730 m, primary forest, 26.3.1996, leg. R. Brechlin (colls. Behounek, Krusek, HNHM, Budapest); 3♂♂, Bali, Byan Lake, 1300 m, 8-10. Feb. 1997, leg. Cerny (coll. Behounek); 1♂ Bali, Batur, 1200 m, 8.1.1999, leg. Cerny (coll. Behounek, 1♂, 3♀♀, Bali, 5 km N. Batur, 1600 m, 11.1.1999, leg. Cerny (coll. Behounek) – 3♂♂, 3♀♀, Sulawesi, Puncak, Palopo, 900-1300 m, 2°55' S, 120°05' E, January 1997, native collector leg., ex coll. Brechlin (colls. Behounek, HNHM Budapest); 4♂♂, 2♀♀, Sulawesi, Puncak, Palopo, 900-1300 m, 2°55' S, 120°05' E, Jan.1997, leg. local collector, ex coll.Brechlin (colls Behounek, HNHM Budapest) (Slide Nos. 5220, 5297, 5298, 5298, Behounek, ♂♂, 5217, 5242, Behounek, ♀♀).

Diagnosis. *T. brechlini* resembles externally mostly to *T. aureopicta* by its golden area extending below the first anal vein but the inner extension is narrower, the golden area is cleaner with much weaker reticulation. The ♂ genitalia of the new species differ from the related taxa by the triple terminal cornutus of vesica, the medial one is significantly longer than the cornuti of *T. intermixta*, *T. aureopicta* and *T. cernyi*. The genital capsula is similar to those of *T. intermixta* and *T. cernyi* but the vinculum is narrower, apically less splayed, the harpe is finer and the clavus is slightly longer. The ♀ genitalia differ from those of *T. intermixta, T. cernyi* and *T. aureopicta* by the broader ostium bursae and the longer, narrower corpus bursae, the sclerotized plate at proximal end of ductus bursae weaker than that of *T. cernyi*.

Description

Wingspan 32-33 mm, length of forewing 16-17 mm. Head, collar and prothoracic tuft orange-brownish, tegulae and metathorax dark violaceous red-brown mixed with whitish. Abdomen ochreous mixed with reddish-brown, dorsal crest and anal tuft dark red-brown. Forewing elongated, rather high with apex acute, ground colour deep, brilliant reddish brown with violaceous shade and fine reticulation. Basal and antemedial crosslines obsolete, orbicular stigma small, flattened, reniform narrow, medially constricted, both encircled with pale greyish, filled with ground colour. Stigma large, more or less quadrangular, brilliant golden, fused partly with large golden patch of marginal area. Postmedial line sharply defined, dark brown marked with violaceous grey, angled inwards below cell then outwards at vein an1. Golden patch of marginal area brilliant golden, finely reticulate with red-brown and violaceous, its lower edge rather diffuse, extending below vein an1 in tornal area. Subterminal strongly sinuous, red-brownish, regularly clearly visible. Terminal line dark brown, cilia as ground colour, with darker brown inner line and with a few dark spots. Hindwing pale ochreous, veins and broad marginal area suffused with cupreous brown, discal spot and transverse line regularly poorly visible. Terminal line brown, cilia ochreous with darker inner line.

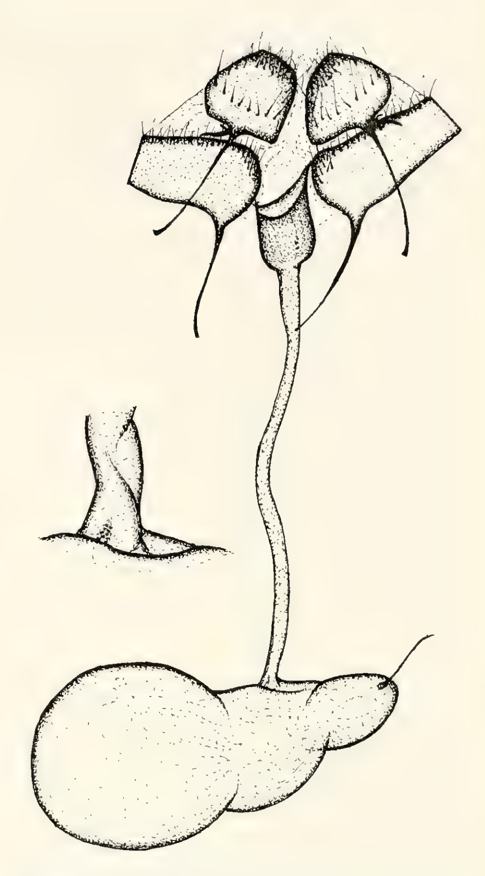


Fig. 13. *Thysanoplusia brechlini*, spec. nov. Paratypus: ♀, Flores.

♂ genitalia (fig. 12). Uncus long, slender, curved, apically hooked, tegumen broad, relatively low, fultura inferior high, elliptical, vinculum long with apical part (saccus) broadened, more or less triangular with rounded apices and slight medial incision. Valva very long, narrow, slightly constricted at medial third, cucullus dilated with apex rounded, corona represented by a larger, setose field. Sacculus short, sclerotized, clavus long, slender, stronger, somewhat longer than harpe. Harpe fine, straight, stick-like. Aedeagus cylindrical with globular basal part, ventral sclerotized plate long, fine, carina with a fine, long, terminally dentated bar. Vesica tubular, narrow, slightly inflated at base, proximal half covered densely with minute spiculi, terminal cornutus triple, medial one long, pin-like, lateral ones significantly shorter, less acute.

♀ genitalia (fig. 13). Ovipositor rather large, papillae anales rounded triangular, gonapophyses long, slender. Ostium bursae calyculate, scobinate, ductus bursae very long, narrowly tubular, membranous with only very poor granulation, its anterior end slightly twisted, bearing a very small, weak, dentated plate at junction to bursa copulatrix. Corpus bursae elongated-ovoid, cervix bursae relatively long, conical.

Bionomics and distribution. Indonesia: Bali, Flores, Timor, Sulawesi.

Etymology. The new species is dedicated to Dr. Ronald Brechlin.

Ctenoplusia (Ctenoplusia) placida sundicata, subspec. nov.
Plate 1, figs 15, 16

Types. Holotype: ♂, Indonesia, Timor (Barat), Prov. Nusa Tenggara Timur Gunung (=Mt.) Mutis (S), 1460 m, Fatumnasi, 21-23.3.1996, cultivated area-secondary vegetation, leg. R. Brechlin (coll. HNHM Budapest) (Slide No. RL6121). – Paratypes: 2♂♂, 3♀♀, Indonesia. Timor (Barat), Prov. Nusa Tenggara Timur Gunung (=Mt.) Mutis (S), 1730 m, 5 km N Fatumnasi, 26.3.1996, primary forest, leg. R. Brechlin; 1♂, Prov. Nusa Tenggara Timur Gunung (=Mt.) Mutis (S), 1460 m, Fatumnasi, 21-23.3.1996, cultivated area-secondary vegetation, leg. R. Brechlin, 1♀, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17-21.4.1996, leg. R. Brechlin; 1♀, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (N) 9 km E Rutang, 1140 m Sec.-Prim.forest, 14.-15.4.1996 leg. R. Brechlin, (coll. Behounek); 1♀, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (N) 9 km E Rutang, 1140 m, secondary-primary forest, 14-15.4.1996, leg. R. Brechlin (coll. Behounek); 1♀, Flores, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17-21.4.1996, leg. R. Brechlin (HNHM, Budapest) (Slide Nos. RL6122, RL6123, RL6177, ♀s, 5214, Behounek, ♂, 5215, Behounek, ♀)

Diagnosis. The populations of *C. placida* (Moore, 1884) living in Timor and in Flores differ from the typical ones occurring in the Himalayan region, Sri Lanka, S India, Taiwan, Indochina by their somewhat shorter, higher forewings with conspicuously reticulate scaling, darkened costal area and even more straight postmedial line. The ♂ genitalia of the two subspecies are very similar in most features except the valval shape, the valva of the new subspecies is narrower, more elongated, especially the cucullus is significantly narrower, higher than those of *C. placida placida*. In addition, the vesica of the new subspecies is slightly shorter, narrower; in the ♀ genitalia the ductus bursae, *C. placida sundicata* is somewhat shorter.

Description

Wingspan 28-33 mm, length of forewing 13-16 mm. Head and thorax dark olive-greyish mixed with whitish and red-brown hairs, abdomen pale ochreous grey, dorsal crest darker brown, anal tuft ochreous with blackish sternal coremata. Forewing moderately long, high triangular with apex pointed, ground colour shining dark olive-grey with intense metallic greenish brilliance; scaling conspicuously reticulate. Costal and basal areas and inner part of marginal field irrorated with pinkish- or violet-grey. Wing pattern sharply defined, ante- and postmedial crosslines oblique, straight, double, dark brown filled with pinkish, latter with a fine pinkish stripe at outer side. Basal area narrow, medial area relatively broad, less variegated, darkened below cell, darkest part of wing. Orbicular and reniform stigmata small, encircled with fine silvery-pinkish lines, filled with greenish grey, former large, rounded, latter relatively narrow, constricted at middle. Stigma large, marked by a fine silvery-pinkish line forming a wide, open V. Subterminal line rather diffuse, pinkish, less sinuous but with a stronger angle at vein m3; defined by a wide, darker inner zone. Terminal line continuous, fine, dark olive-brown, upper half marked by a fine pinkish white line, cilia dark olive-grey, finely spotted with whitish and a few blackish scales. Hindwing ochreous-whitish, inner part narrow, irrorated strongly with greyish-brown, veins darker, discal spot and transverse line absent or poorly visible, marginal area broad, with strong dark brown suffusion. Terminal line dark brown, cilia ochreous-whitish with dark brown medial stripe. Underside of forewing almost fully covered by dark brownish-grey, traces of stigma and subterminal line visible, paler. Inner area of hindwing ochreous-whitish, marginal area with strong grey-brown suffusion, discal spot absent or hardly recognisable.

Bionomics and distribution. Indonesia: Timor, Flores.

Ctenoplusia (Ctenoplusia) sumbawana, spec. nov.
Plate 1, fig. 17, text-fig. 14

Types. Holotype: ♂, "Indonesia, Sumbawa, Prov. Nusa Tenggara Barat, Kempo, 30 km W Dompu, 180 m, Primär/Secundär Wald, 17.-18.3.1996, leg. R. Brechlin" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5210 Behounek). – Paratypes: 1♂, Indonesia, Sumbawa, Prov. Nusa Tenggara Barat, Bima-Airport (Palibelo) 50 m, secondary forest, 12.3.1996, (1) leg. R. Brechlin; 2♂♂, Prov. Nusa Tenggara Barat, Kempo, 30 km W Dompu, 180 m, primary/secondary forest, 17-18.3.1996, leg. R. Brechlin (colls Behounek, HNHM, Budapest) (Slide No. RL5759, ♂).

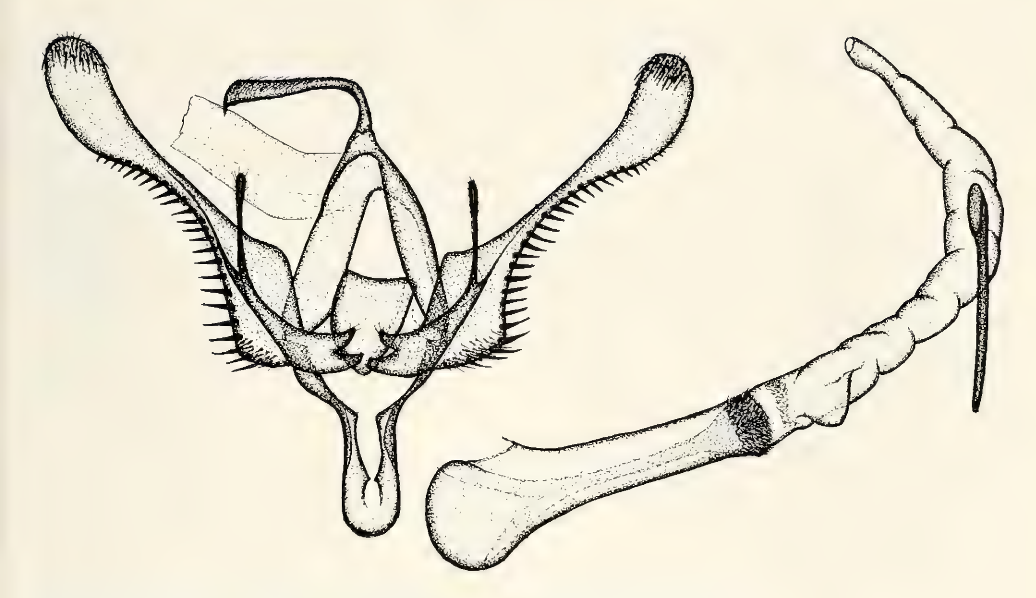


Fig. 14. *Ctenoplusia (Ctenoplusia) sumbawana*, spec. nov. Holotypus: ♂, Sumbawa.

Diagnosis. The new species belongs to the *Ctenoplusia furcifera* (Walker, 1857) – *C. kosemponensis* Strand, 1920 species-group, appearing as an isolated member of the group occurring only in Sumbawa while *C. furcifera* is widespread from the southern Himalayan region to New Guinea, *C. kosemponensis* is known from Taiwan and from the Indian subcontinent. The external appearance of the three species is rather similar but *C. furcifera* is more unicolorous, without stronger golden suffusion below cell which regularly present in the two other species. The general coloration of *C. sumbawana* is paler than that of *C. kosemponensis*, the golden patch below cell is less conspicuous, more diffuse while the metallic reflection of the marginal area is stronger, the antemedial line is less sinuous, more oblique.

The ♂ genitalia of the new species differ from those of the related taxa by its longer, apically dilated uncus, more elongated, medially much more constricted valva with longer cucullus having no triangular ventral lobe, longer harpe and longer cornutus of the vesica, longest in the species-group.

Description

Wingspan 27 mm, length of forewing 13 mm. Head and thorax dark brown mixed with a few ochreous-greyish, tegulae marked with whitish-grey, metathoracic tuft large, dark brown with paler red-brownish tip. Abdomen ochreous-brownish, dorsal crest well-developed, dark, anal tuft very strong, ochreous-greyish. Forewing rather short, high triangular with apex pointed, ground colour dark greyish brown with intense golden-greenish and reddish-bronze brilliance, especially below cell and in marginal area. Wing pattern rather sharply defined, antemedial line oblique, straight below cell, postmedial line sinuous, both crosslines dark brown with silvery whitish filling, latter with dark pinkish-greyish definition on outer side. Basal area narrow, darkened, medial area relatively wide. Orbicular and reniform stigmata small, encircled with fine slivery-whitish and blackish lines, defined with blackish-brown spots, former oblique, flattened, latter narrow, strongly constricted at middle. Stigma relatively large, golden-silvery, more or less conjoined, inner part broadly U-shaped, outer spot small, elongated. Subterminal line diffuse, whitish, sinuous, with darker brownish definition, terminal line a row of small dark dots; cilia pale brownish-whitish, spotted with darker brown and blackish. Hindwing ochreous-whitish, suffused with dark brown, marginal area and veins even darker, blackish-brown; discal spot present, small, transverse line poorly visible. Terminal line brown, cilia ochreous-whitish, irregularly spotted with brown. Underside of wings shining ochreous-whitish with variably strong blackish-brown suffusion, stronger on forewing; trace of stigma poorly visible. Hindwing paler, with broad, dark marginal suffusion, discal spot present, diffuse.

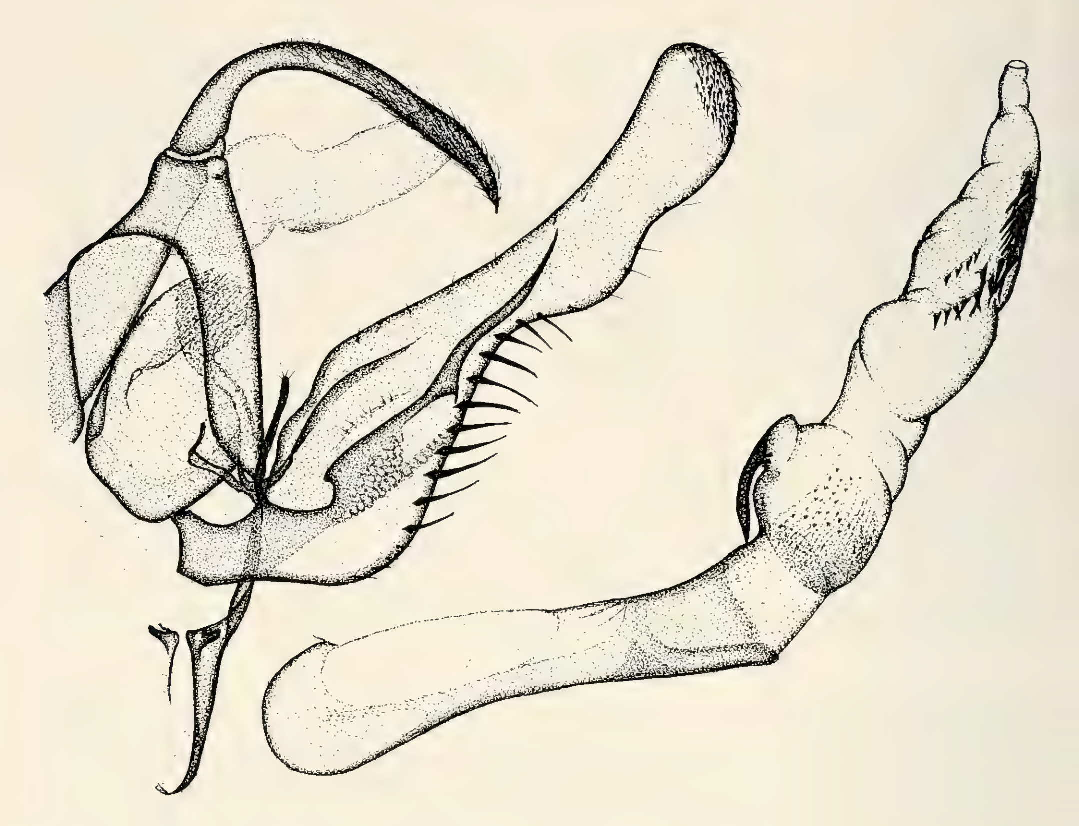


Fig. 15. *Ctenoplusia (Acanthoplusia) armata*, spec. nov. Holotypus: ♂, Mindanao.

♂ genitalia (fig. 14) Uncus long, curved at base, distally dilated, apical hook long, strong. Tegumen high, fultura inferior rather weak but large, shield-like, vinculum long, distal-two-third almost parallel, tip rounded, inner lobes small, triangular. Valva long, medially strongly constricted, cucullus rather long, with setose, rounded apex. Subbasal costal lobe strong, triangular, pointed, ventral angle variably prominent but relatively strong, macrosetae short, thick, shortened from middle to lower edge of cucullus. Sacculus short, clavus short, wedge-shaped, setose, harpe ling, stick-like, apically slightly dilated, covered with sensory setae. Aedeagus cylindrical, medium-long, ventral sclerotized plate rather weak, carina covered with a large amount of tiny spiculi. Vesica rather short, tubular, curved, basal part with a small, subconical diverticulum and a scobinated collar, terminal cornutus very long, stick-like, finely pointed.

♀ unknown.

Bionomics and distribution. Indonesia: Sumbawa, Flores.

Ctenoplusia (Acanthoplusia) armata, spec. nov.

Plate 2, figs 30, 31, text-fig. 15

Types. Holotype: ♂, "Philippines, Mindanao, S Mt. Kitanglad, 2800 m, 15.8.-15.9.1993, leg. Siniaev" (HNHM, Budapest) (Slide No. RL4778). – Paratypes: 4♂♂, with same data as holotype (colls. Thöny and Behounek).

Diagnosis. *A. armata* is the allopatric sister species of *A. eugrapha* Hampson, 1913, known from Papua New Guinea. The new species differs from its twin species by its larger size, much darker, less shining forewings with much more sinuous ante- and postmedial crosslines with darker, narrower pinkish definition, paler hindwing, etc.

The ♂ genitalia show also conspicuous differences, the new species has more curved uncus, longer valva with significantly longer, narrower cucullus, essentially longer, acute harpe and different, more complex armature of the vesica.

Description

Wingspan 29-31 mm, length of forewing 13-14 mm. Head and thorax pale chocolate-brown mixed with pinkish-whitish and dark brown hairs. Forewing elongated with apex pointed, ground colour shining, light tobacco-brown with intense golden-greenish brilliance below cell and in marginal area; wing relatively strongly variegated with dark brown and whitish. Wing pattern rather sharply defined, ante- and postmedial crosslines sinuous, oblique, dark brown, with strong, conspicuous dark pink definition on both sides. Basal area narrow, darkened, medial area relatively narrow, orbicular and reniform stigmata small, encircled with fine pinkish lines, defined with blackish-brown spots, former oblique, flattened, latter narrow, strongly constricted at middle. Stigma relatively big, silvery, conjoined, inner part broad U-shaped, outer spot small, elongated. Subterminal line diffuse, whitish, sinuous, terminal line a row of small dark triangles, base of cilia whitish, spotted with brown. Hindwing ochreous-whitish, marginal area and veins with stronger dark covering; discal spot present, diffuse, transverse line poorly visible. Terminal line brown, cilia ochreous-whitish, irregularly spotted with brown. Underside of wings shining ochreous whitish with variably strong dark brown suffusion, stronger on forewing. Traces of stigma poorly visible, shadows of medial and subterminal lines rather strong. Hindwing with two parallel, diffuse lines in outer half of wing, discal spot strong, diffuse.

♂ genitalia (fig. 15). Uncus long, slender, curved, apically hooked. Tegumen high, narrow, fultura inferior large, elliptical, vinculum medium-long, narrow, terminally finely rounded, inner lobes very small. Valva elongated, strongly constricted at middle, cucullus broadened, long, more or less foot-shaped with apex rounded, densely setose. Ventral margin with relatively few (8), rather weak macrosetae; dorsal surface with a large field of androconial scales. Sacculus very short, clavus long, gracile, more or less S-shaped, harpe very long, acute, sword-like having long, sclerotized basal bar. Aedeagus long, ventral sclerotized ribbon long, strong, carina with scobinate collar and a long, narrow dorsal bar. Vesica short – shorter than aedeagus -, narrow, tubular, basal part with a cornuti field consisting of numerous fine spinules and a long, curved cornutus, as a direct continuation of dorsal bar of carina and a rather narrow ring of fine, pointed spiculi posteriorly. Distal half tapering, covered sparsely with tiny spiculi, armed with a row of medium-long, wide-based cornuti.

♀ unknown.

Bionomics and distribution. The species is known from the type locality only.

Etymology. The specific name is given because of the strong, sword-like harpe and the cornuti of the vesica.

Ctenoplusia (Acanthoplusia) latistigma floresiana, subspec. nov.

Plate 2, figs 33, 34, text-fig. 16

Types. Holotype: ♂, "Indonesia, Timur, Flores, Golo Luseng, 1820 m, leg. Paukstadt" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5079, Behounek). – Paratypes: 3♂♂, Indonesia, Flores, Prov. Nusa Tenggara Timur Gunung, 18 km E Labuhanbajo, 200 m primary forest, 9-12./22.4.1996, leg. R. Brechlin; 1♂, Prov. Nusa Tenggara Timur Gunung, Ranggawatu, Telecom-station, 33 km E Labuhanbajo, 900 m, primary forest, 13.4.1996, leg. R. Brechlin; 2♂♂, Prov. Nusa Tenggara Timur Gunung,(=Mt.) Ranaka (N) 9 km E Rutang, 1140 m, secondary-primary forest, 14-15.4.1996, leg. R. Brechlin; 6♂♂, Prov. Nusa Tenggara Timur Gunung, (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17-21.4.1996, leg. R. Brechlin; 1♂, Timor, Barat, Prov. Nusa Tenggara Timur, Gunung (Mt.) Mutis (S) 1460 m, Fatumnasi, 21-23.3.1996, leg. R. Brechlin; 1♂, Toímor, Prov. Nusa Tenggara Timur, Gunung (Mt.) Mutis (S) 5 km N Fatumnasi, 1730 m, primary forest, 26.3.1996, leg. R. Brechlin (colls. Behounek, HNHM, Budapest, coll. Krusek) (Slide Nos. 5208, 5213, Behounek, RL6183, Ronkay, ♂♂).

Diagnosis. The populations of the taxa of the *C. (A.) latistigma latistigma* Prout, 1922 lineage, known from Ceram (type locality), Flores, Timor and from Sulawesi are rather different externally, while the ♂ genitalia of the specimens show only slight differences especially in the number of cornuti of the vesica and the shape and size of the cucullus but with certain, partly overlapping individual variation. Therefore they considered as insular subspecies of the same, rather widely distributed species. *C. (A.) latistigma floresiana* differs from the nominotypical subspecies by its more unicolorous forewings with

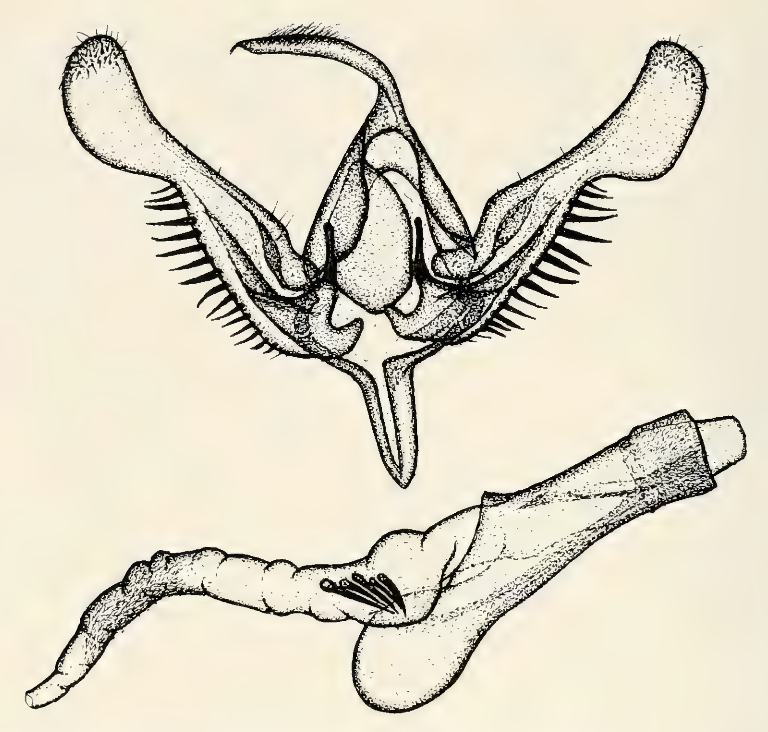


Fig. 16. *Ctenoplusia (Acanthoplusia) latistigma floresiana*, subspec. nov. Holotypus: ♂, Flores.

less darkened medial area below cell, less intense metallic golden brilliance but with more extensive pale violet-greyish irroration. The ♂ genitalia of the two subspecies are very similar, but the harpe of the new subspecies is more reduced, a minute spine, and the cucullus issomehat more elongated. The holotype of *C. (A.) latistigma latistigma* has six strong medial cornuti in the vesica while three of the four dissected specimens of *C. (A.) latistigma floresiana* have five cornuti and only the fourth specimen is armed with six cornuti.

Description

Wingspan 28-30 mm, length of forewing 13-14 mm. Head and thorax dark brown mixed with whitish, orange-yellowish and red-brown hairs. Abdomen paler, more greyish, dorsal crest consisting of large, apically blackish tufts, anal tuft ochreous. Forewing moderately long, high triangular with apex pointed. Ground colour dark brown with intense but rather fade golden-greenish brilliance, costal and basal areas and outer part of marginal field with strong, pale violet-grey and pinkish irroration. Wing pattern sharply defined, antemedial line slightly, postmedial rather strongly sinuous, both crosslines double, dark brown, with whitish-pinkish definition on both sides, postmedial strongly angled inwards below stigma. Basal area narrow, medial area relatively broad, less variegated, darkened below cell, darkest part of wing. Orbicular and reniform stigmata small, encircled with fine whitish-pinkish lines and a few dark (blackish-brown) spots, former oblique, flattened, latter narrow, strongly constricted at middle. Stigma relatively big, silvery, conjoined or separated into two distinct spots, inner part broadly U- or V-shaped, outer spot small, elongated. Subterminal line whitish, almost straight, defined by a darker inner stripe. Outer half of marginal field with a fine, interrupted pinkish line and a stronger dark spot at vein m3. Terminal line a row of partly fused, small blackish triangles, cilia greyish, spotted with brown. Hindwing ochreous-whitish, inner part narrow, with weak brownish irroration, marginal area broad, suffused strongly with dark brown. Veins also darker; discal spot diffuse, lunulate, transverse line absent or poorly visible. Terminal line dark brown, cilia white(ish), irregularly spotted with brown and blackish. Underside of wings shining ochreous whitish with variably strong greyish brown suffusion, regularly stronger on forewing. Trace of stigma poorly

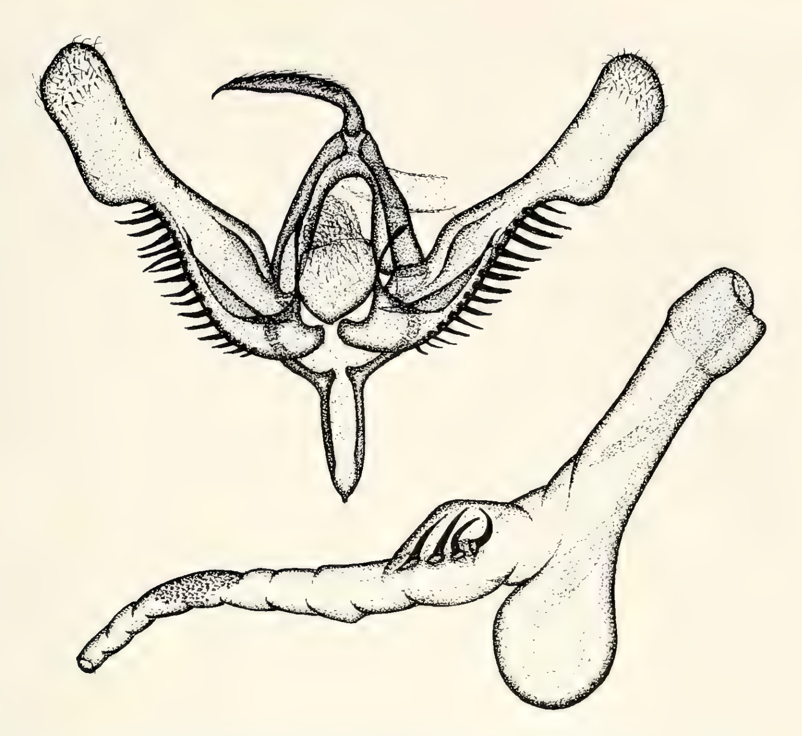


Fig. 17. *Ctenoplusia (Acanthoplusia) latistigma sulawesiana*, subspec. nov. Holotypus: ♂, Flores.

visible, shadows of medial and subterminal lines rather strong. Hindwing with two parallel, diffuse lines in outer half of wing and with variably strong marginal suffusion, discal spot diffuse but regularly strong.

♂ genitalia (fig. 16). Uncus rather long, slender, finely curved, apically hooked. Tegumen high, narrow, fultura inferior large, more or less elliptical, vinculum medium-long, narrow, pointed terminal. Valva elongated, strongly constricted below cucullus. Cucullus elongated, more or less foot-shaped with apex rounded, apical part densely setose. Ventral margin with 14-18 rather strong macrosetae; dorsal surface with a large field of androconial scales. Sacculus short, clavus long, strong, straight, harpe reduced to a minute spine at top of its flattened, cuneate basal bar. Aedeagus long, ventral sclerotized ribbon long, strong, carina with scobinate collar and a long, narrow dorsal bar. Vesica narrow, tubular, hyaline, recurved ventro-laterally at middle. Medial third slightly dilated, armed with five strong, medially curved, pointed cornuti. Distal third tapering, covered with short, small spiculi.

♀ unknown.

Distribution. Indonesia: Timor, Flores.

Etymology. The name of the taxon refers to the home land of the subspecies.

Ctenoplusia (Acanthoplusia) latistigma sulawesiana, subspec. nov.

Plate 2, fig 32, text-fig. 17

Types. Holotype: ♂, "Indonesia, Sulawesi-süd, Puncak, Palopo, 900-1300 m, 2°55' S, 120°05' E, Jan.1997, leg. einh. Sammler", ex. coll.Brechlin (coll. Behounek, coll. ZSM, Munich) (Slide No. 5297, Behounek). – Paratypes: 2♂♂, with same data as holotype (colls. Behounek, HNHM, Budapest) (Slide Nos. RL6184, RL6185, Ronkay, ♂♂).

Diagnosis. The population occurring in Sulawesi differs from the other two subspecies by its paler ground colour, broad, more shining, diluted costal and marginal areas with more intense pinkish



Fig. 18. *Ctenoplusia (Acanthoplusia) dufayi*, spec. nov. Paratypus: ♂, N-Luzon.

irroration, less angled, more defined postmedial line and stronger, more sinuous subterminal line. The ♂ genitalia (fig. 17) of *C. (A.) latistigma sulawesiana* differ from those of the other two subspecies by the shape and length of the cucullus – which is longest, narrowest in *C. (A.) l. sulawesiana* – and the length of the harpe but these features are rather variable and may partly overlapping in the three subspecies of *C. (A.) l. latistigma*. The number of the large cornuti of the vesica is also variable, as *C. (A.) l. sulawesiana* has four or five, *C. (A.) l. floresiana* five or six while the holotype of *l. latistigma* (slide No. 4432 BMHN) has six strong medial cornuti.

Distribution. Indonesia: Sulawesi.

Etymology. The name of the taxon refers to the home land of the subspecies.

Ctenoplusia (Acanthoplusia) dufayi, spec. nov.

Plate 2, fig. 35, text-figs 18, 19

Types. Holotype: ♂, "Philippines, N-Luzon, Ifugao, Banaue, vic 20 km nördl. Laguna, 1200 m, 16°54' nördl.Breite/121°06' östl. Länge, [Sekundärwald, Reisfelder], 22.9.-16.10.1988, leg. K. Cerny & A. Schintlmeister" (coll. Behounek, coll. ZSM, Munich) (Slide No. 5081, Behounek). – Paratypes: 1♀, Philippines, N Luzon: 1♀, Mts. Prov. Chatol, 15 km SE Bontoc, 17°02' N, 121°02' E, [Nebelurwald], 1600 m, 24.9., 14.10.1988, leg. K. Cerny & A. Schintlmeister (coll. Behounek); 2♂♂, with same data (HNHM, Budapest); 2♂♂, Prov. Ifugao, Kinakins, 5 km E Banaue, 1200 m, 21.07.1993, leg. M. Schaarschmidt (colls. Behounek and Graul); 2♂♂, Prov. Ifugao, Mt. Polis, 20 km N Banaue, 1600 m, 26.07.1993, leg. M. Graul (colls. Behounek and Graul); 5♂♂, 1♀, Prov. Bontoc, Mt. Data Hotel, 10 km E Bontoc 1900 m, 02.08.1993, leg. M. Graul (colls. Behounek, Graul and HNHM Budapest) (Slide Nos. RL3132, RL3152, Ronkay, ♂♂, 5116, Behounek, ♀).

Diagnosis. The closest relative of the new species is *A. herbuloti* Dufay, 1982, differing from it by its paler pinkish brown, less variegated forewings, especially in medial area and the inner half of the

marginal field, less sinuous ante- and postmedial crosslines with wide whitish-pinkish definition, more oblique stigma, etc.

The ♂ genitalia of the two species are rather strongly different, *A. dufayi* has longer, more curved uncus, somewhat broader valva with dilated, rounded cucullus and less sinuous ventral margin, more curved, medially not ribbed harpe and the different armature of the vesica. *A. dufayi* has more cornuti with more equal size, especially at base where the first two (three) cornuti are considerably larger in *A. herbuloti*, the terminal part of the vesica is covered with much larger number of minute spiculi.

The ♀ genitalia of *A. dufayi*, comparing with those of *A. herbuloti*, have stronger, longer, more sclerotized but less ribbed ductus bursae, shorter, less wrinkled, not recurved cervix bursae and shorter, more ovoid corpus bursae.



Fig. 19. *Ctenoplusia (Acanthoplusia) dufayi*, spec. nov. Paratypus: ♀, N-Luzon.

Description

Wingspan 29-31 mm, length of forewing 13-15 mm. Head and thorax pale tobacco-brown mixed with whitish, pale grey and dark brown hairs, abdomen pale ochreous grey, dorsal crest darker brown, anal tuft brownish. Forewing moderately long, high triangular with apex pointed. Ground colour shining, light tobacco-brown with intense but fade golden brilliance, costal and basal areas and outer part of marginal field with strong whitish-pinkish irroration. Wing pattern rather sharply defined, ante- and postmedial crosslines slightly sinuous, dark brown, with strong, conspicuous whitish-pinkish definition on both sides. Basal area narrow, medial area relatively broad, less variegated below cell, orbicular and reniform stigmata small, encircled with fine whitish lines, marked with some dark (blackish-brown) spots, former oblique, flattened, latter narrow, strongly constricted at middle. Stigma relatively big, silvery, most often divided into two distinct spots, inner part V-shaped, outer spot small, elongated. Subterminal line whitish, sinuous, outer half of marginal field with a fine pinkish white line and stronger whitish irroration. Terminal line a row of partly fused, small dark triangles, cilia whitish, spotted with brown. Hindwing ochreous-whitish, inner part with weaker, marginal area with stronger dark brown suffusion, veins also darker; discal spot and transverse line absent or poorly visible. Terminal line dark brown, cilia ochreous-whitish, irregularly spotted with brown. Underside of wings shining ochreous whitish with variably strong dark brown suffusion, regularly stronger on forewing. Traces of stigma poorly visible, shadows of medial and subterminal lines rather strong. Hindwing with two parallel, diffuse lines in outer half of wing, discal spot diffuse but regularly present.

♂ genitalia (fig. 18). Uncus long, slender, curved, apically hooked, tegumen high, relatively narrow, fultura inferior large, pentagonal, vinculum medium-long, strong, V-shaped. Valva elongated, distally tapering towards neck of cucullus, Cucullus broadened, with apex rounded, densely setose. Sacculus very short, clavus long, stick-like, apically finely dilated, covered with sensory setae. Harpe strong, long, distally curved, apex acute. Aedeagus long, carina with long lateral bars, vesica broadly tubular, distally tapering, armed with a long row of fine, acute spines of variable size, most of them medium-sized or rather long.

♀ genitalia (fig. 19). Ovipositor moderately long, weak, posterior papillae anales small, rounded, gonapophyses rather long, fine. Ostium bursae membranous, calyculate, ductus bursae sclerotized, posterior part narrow, tubular, anterior two-third broad, flattened, finely ribbed. Cervix bursae elon-



Fig. 20. *Ctenoplusia (Acanthoplusia) javana*, spec. nov. Holotypus: ♂, Java.

gated, weakly rugulose, apically pointed, corpus bursae elliptical-ovoid.

Bionomics and distribution. Philippines: Luzon.

Etymology. The new species is dedicated to Dr. Claude Dufay.

Ctenoplusia (Acanthoplusia) javana, spec. nov.

Plate 1, fig. 13, text-fig. 20

Holotype: ♂, "Tjinjiroean, Gouv. Klna-Ondern, 1700 m, (Malabar Geb. W. Java) Dr H.W. v.d. Weele coll, Dec 1909" (coll. RNH Leiden) (Slide No. RL4464, Ronkay).

Diagnosis. *A. javana* is the twin species of *A. kobesi* Behounek et Thöny, 1995, both species are known by their unique types. The new species has shorter, more unicolorous forewings with more straight, less sinuous ante- and postmedial crosslines, with less intense whitish-pinkish definition.

The ♂ genitalia of the two species are rather close, but the valvae of *A. javana* are longer, narrower with more elongated cucullus, the harpe is finer, shorter, the vinculum is longer and the tube of vesica is considerably longer, the two cornuti are stronger, longer, more straight and acute, situated far more terminally than in case of *A. kobesi*.

Description

Wingspan 25 mm, length of forewing 12 mm. Pubescence of thorax dark grey-brown mixed with whitish-pinkish, metathoracic tuft large. Forewing rather short, high triangular with apex pointed. Ground colour pale greyish brown with intense metallic shining and whitish and blackish irroration. Basal area narrow, suffused with whitish, ante- and postmedial lines sinuous, darker brown with whitish-pinkish definition on both sides. Medial area relatively broad, variegated, orbicular and reniform stigmata small, flattened, encircled with fine whitish lines, marked with some dark (blackish-brown) spots. Stigma small, silvery, divided into two distinct parts, inner part a fine U, outer spot small, rounded. Subterminal line whitish, strongly sinuous, marked with a few dark spots, inner half of marginal area glossy golden-brownish, outer half paler with stronger whitish irroration. Terminal line

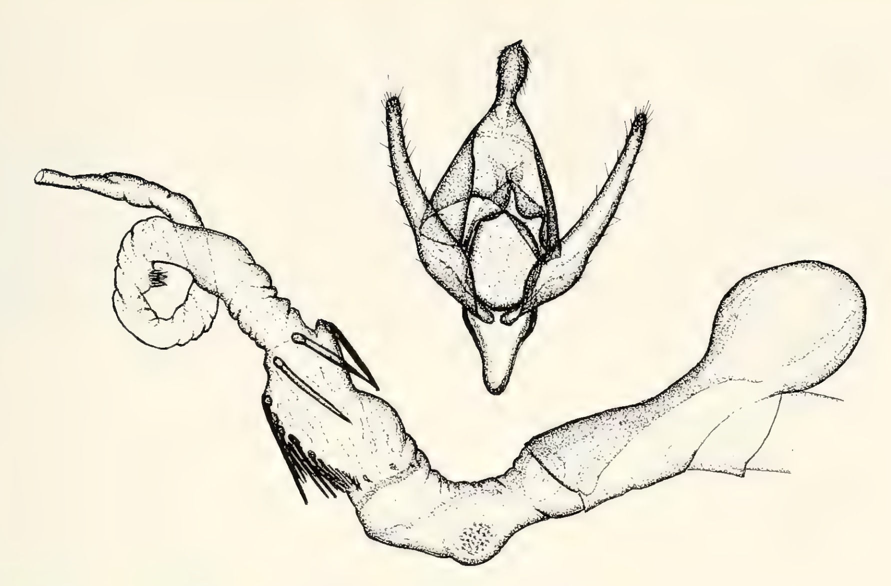


Fig. 21. *Chrysodeixis (Chrysodeixis) papuasiae* Dufay, 1970, ♂, New Guinea.

partly interrupted, dark brown, cilia white, spotted with small, dark brown patches. Hindwing whitish, covered with dark brown, marginal suffusion broad, veins also darker; discal spot and transverse line poorly visible. Terminal line dark brown, cilia white(ish), irregularly spotted with brown. Underside of wings ochreous whitish, forewing with stronger, hindwing with weaker grey-brownish suffusion. Traces of stigma rather clearly visible, shadow of subterminal line also rather strong. Hindwing with two parallel, diffuse lines in marginal area, discal spot diffuse.

♂ genitalia (fig. 20). Uncus long, strongly curved at middle, apical hook short, weak. Tegumen medium-high, relatively narrow, fultura inferior calyculate, vinculum long, narrow, terminally finely rounded. Valva long, narrow, medially weakly constricted, cucullus slightly broadened, more or less foot-shaped with apex rounded, setose. Sacculus very short, clavus long, straight, stick-like, harpe reduced to a short, acute spine having long, sclerotized basal bar. Aedeagus long, ventral sclerotized ribbon long, strong, carina with long ventral bar and fine scobination. Vesica long, tubular, distally tapering, recurved. Subbasal part covered with minute spiculi, terminal third armed with two long, strong, wide-based cornuti and two small fields of fine denticles.

Bionomics and distribution. Distribution: Indonesia: Java. The unique ♂ specimen was collected in the western part of Java at a relatively high altitude in the "winter" period.

Etymology. The specific name refers to the home island of the taxon.

2. New records of little known Plusiinae species

Chrysodeixis (Chrysodeixis) papuasiae Dufay, 1970

Plate 2, figs 22, 23, text-figs 21, 22

Bull. Soc. linn. Lyon 39: 102 (Holotypus: ♂, New Guinea, coll. Dufay)
=*decorata* WARREN, in litt.

Material examined: Papua New Guinea: 1♂, Biagi, Mambare, 5000 ft., January 1906, leg. A.S. Meek (coll. BMNH, London). Indonesia. Irian Jaya: 1♀, Mt. Goliath, 5-7000 ft., about 139° long., February 1911, leg. A. S. Meek (coll. BMNH London) (Slide Nos. RL4462, ♂, RL4463, ♀).

Distribution. New Guinea.

Chrysodeixis (Chrysodeixis) luzonensis (Wileman & West, 1929)

Plate 2, fig. 24, text-fig. 23

Novit. Zool. 35: 23 (*Phytometra*) (Holotypus: ♂, Philippines, Luzon, Benguet, coll. BMNH, London)

Material examined: Philippines. N Luzon: 1♂, Luzon, Ifugao, Banaue, 20 km N Laguna, 1200 m, Sept.-Oct.1988, leg. Cerny & Schintlmeister, (Slide No. 5087 Behounek); 1♂, Prov.Bontoc, Chatol, 15 km E Chatol, 1800 m, 24. July 1993, leg. Graul; 1♂, Prov. Bontoc, Chatol, 10 km E Chatol, 1900 m, 24. July 1993, leg. Sinajev (colls Behounek, HNHM, Budapest) (Slide No. RL4739, Ronkay, ♂).

Distribution. Philippines, Luzon.

Chrysodeixis (Chrysodeixis) permissa (Walker, 1858)

Plate 1, fig. 9, text-fig. 24

List. Spec. Lep. Ins. B. M. 15: 1786 (*Plusia*) (Type: India, coll. BMNH, London)

Material examined: Nepal: 2♂♂, Ganesh Himal, 2520 m, near Godlang, 85°17'E, 28°10'N, 13.X.1995, leg. Peregovits and Ronkay (coll. HNHM, Budapest; G. Ronkay). India: 2♀♀, Nilgiri Hills, Kunda Hills, Silent Valley, ca. 1000 m, 76°27'E, 11°05'N, 10-14.12.1982, leg. E. and A. Bauer and Schliermann (coll. HNHM Budapest). Sri Lanka: 1♀, without other details (Slide No. RL651, Ronkay, ♀).

Distribution. India, Nepal, Vietnam, Sri Lanka.

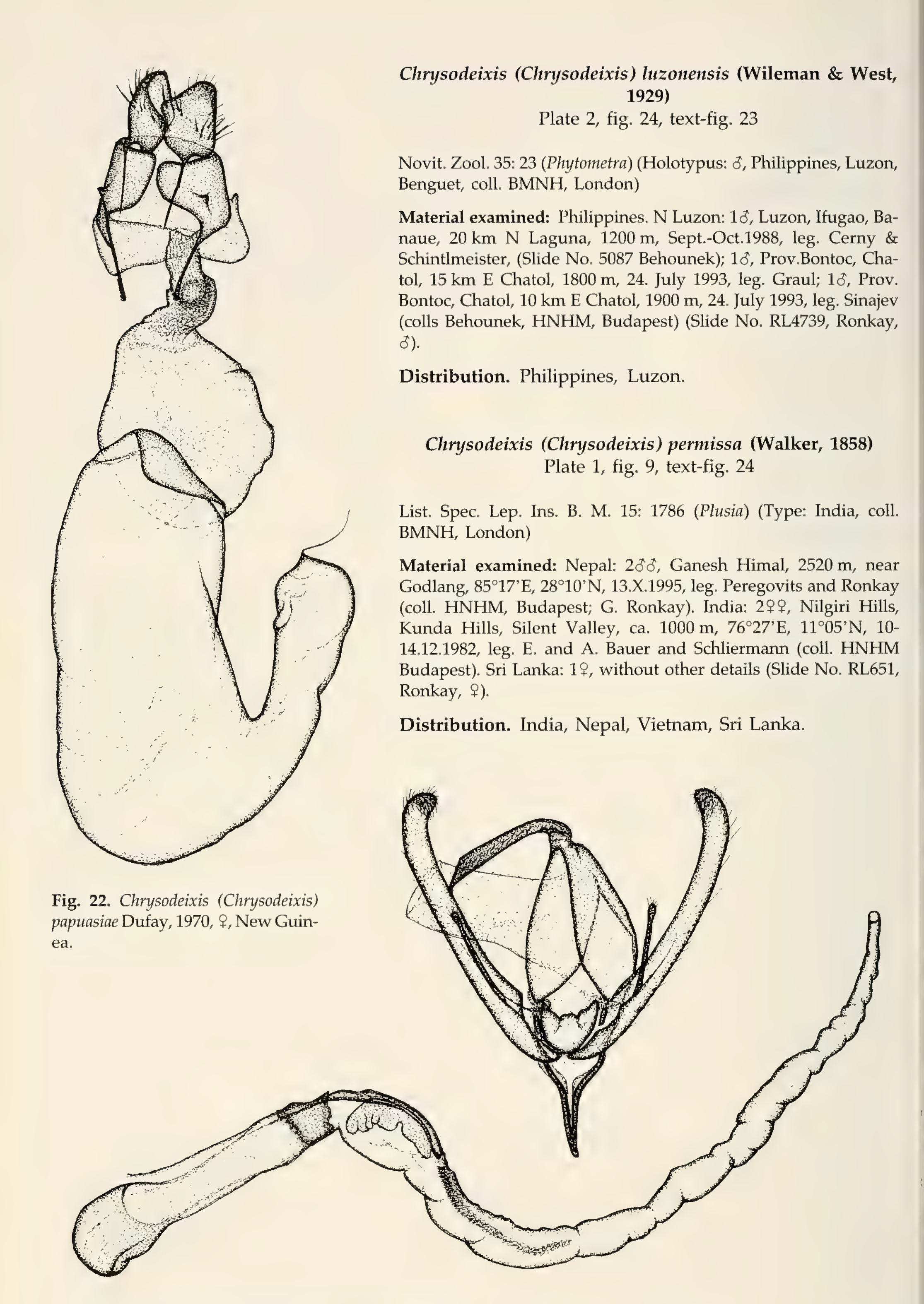


Fig. 22. *Chrysodeixis (Chrysodeixis) papuasiae* Dufay, 1970, ♀, New Guinea.

Fig. 23. *Chrysodeixis (Chrysodeixis) luzonensis* (Wileman & West, 1929), ♂, N-Luzon.

Chrysodeixis (Chrysodeixis) diehli Dufay, 1982
Plate 2, fig. 20

Bull. Soc. linn. Lyon 51: 71, fig. 1, 2, (Holotypus: ♂, Lawalo, Nias, Sumatra, coll. MNHN, Paris)

Material examined: Indonesia. Nias: 3♂♂, vic Sawo, March 1995, leg. Diehl (coll. Behounek).

Distribution. Borneo, Indonesia: Sumatra, Nias, Bali, Java.

Chrysodeixis (Chrysodeixis) plesiostes Dufay, 1982
Plate 2, fig. 21

Bull. Soc. linn. Lyon 51: 72, fig. 3, 4 (Holotypus: ♂, Sumatra, coll. MNHN, Paris)

Material examined: Indonesia. Flores, 18♂♂, Prov. Nusa Tenggara Timur Gunung, 18 km E Labuhanbajo, 200 m, primary forest, 9.12.-22.4.1996, leg. R. Brechlin (coll. Behounek) (Slide Nos.: 5218, 5219, 5238, 5239, Behounek, ♂♂).

Distribution. Indonesia: Sumatra, Flores, Sulawesi. New for the island Flores.

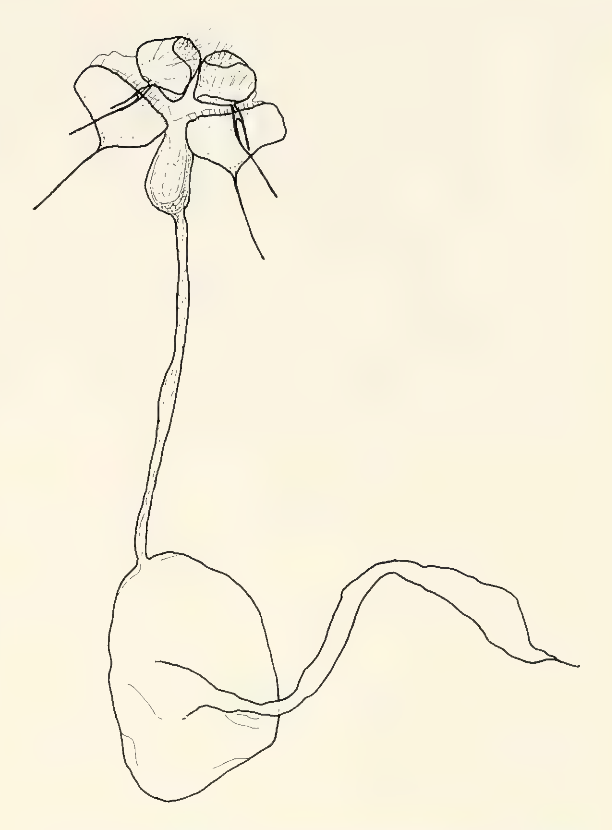


Fig. 24. *Chrysodeixis (Chrysodeixis) permissa* (Walker, 1858), ♀.

Chrysodeixis (Chrysodeixis) dinawa (Bethune-Baker, 1906)
Plate 1, figs 10, 11

Novit. Zool. 13: 270 (*Plusia*) (Holotypus: New Guinea, coll. BMNH, London)

Material examined: Indonesia. Irian Jaya: 2♂♂, Neu Guinea, Nabire, 12 km E Samabusa Lagari, 50 m, 6.-8.12.1993, leg. Brechlin & Cerny; 3♂♂, 6 km E Sambusa Lagari, 50 m, 9-13.12.1993, leg. Brechlin & Cerny.

Moluccas, Ceram sept. (Seram): 3♂♂, Wahal-Air Besar, Manusela, 20 m, 5.1997, leg. H. & F. Taschner (colls Behounek, HNHM, Budapest) (Slide No. 5280, Behounek, ♂).

Distribution. Indonesia, Moluccas, Ceram, New Guinea, New Ireland, Bismarck-Arch. New for the Moluccas and for Ceram.

Chrysodeixis (Chrysodeixis) kebeana (Bethune-Baker, 1906)
Plate 1, fig. 12

Novit. Zool. 13: 271 (*Plusia*) (Holotypus: New Guinea, coll. BMNH, London)

Material examined: Indonesia. Irian Jaya: 1♀, New Guinea, Nabire, 12 km E Samabusa Lagari, 50 m, 6-8. Dec. 1993, leg. Brechlin & Cerny; 1♂, Nabire, 6 km E Sambusa Lagari, 50 m, 9-13. Dec. 1993, leg. Brechlin & Cerny; 1♂, 30 km S Manokwari, Arfak Mts. Ngat Biep, river Ngat valley, 850 m, 18-19. Dec. 1993, leg. Brechlin & Cerny (coll. Behounek) (Slide No. 5240, Behounek, ♂).

Distribution. New Guinea, Fergusson-Islands, New Britain.

Chrysodeixis (Chrysodeixis) kebeae (Bethune-Baker, 1906)
Plate 2, fig. 19

Novit. Zool. 13: 270 (*Plusia*) (Holotypus: New Guinea, coll. BMNH, London)

Material examined: Indonesia. Irian Jaya: 1♂, New Guinea, Nabire, 12 km O Samabusa Lagari, 50 m, 6-8. Dec. 1993, leg. Brechlin & Cerny (coll. Behounek).

Distribution. New Guinea.

Chrysodeixis (Chrysodeixis) politus Dufay, 1970

Bull. Soc. linn. Lyon 39: 103, (Holotypus: ♀, Sumatra, coll. ZSM, Munich)

Material examined: Indonesia. C Bali: 1♂, Byan Lake, 1300 m, 8.-10. Feb. 1997, leg. Cerny (coll. Behounek).

Distribution. Thailand, Indonesia, Sumatra, Java, Bali. New for Bali.

Chrysodeixis (Chrysodeixis) minutus Dufay, 1970
Plate 2, fig. 18, text-fig. 25

Bull. Soc. linn. Lyon 39: 101 (Holotypus: ♂, India, coll. MNHN, Paris)

Material examined: Taiwan. Prov. Taoyuan: 4♂♂, 1♀, 14 km E Fushing, 800 m, 19-25.5.1995, leg. Hreblay & Stéger.

Philippines. Mindanao: 1♀, Bukidnon, Dalongdong, 45 km NW Maramag, Mt. Binasilang, (Bergurwald), 1200 m, 7°55'N 124°40'E, 2.10.1988, leg. Cerny & Schintlmeister (colls. Behounek, HNHM, Budapest) (Slide Nos. RL4292, RL5013, Ronkay, ♂♂).

Distribution. N-India, Himalayas, Sikkim, Nepal, Vietnam, Japan, Taiwan, Philippines.

Thysanoplusia reticulata (Moore, 1882)
Plate 2, fig. 25

Lepid. Atkinson: 148 (*Plusia*) (Syntypes: India, Sikkim, BMNH, London and MNHU, Berlin)

Material examined: Vietnam, 2♂♂, Tam Dao, Vinh Phu, 21.1.1986, leg. Mahunka & Oláh (coll.Behounek).
Taiwan. Chai Hsien: 2♂♂, Alishan, 20.6.1970, leg. Kishida; Nantou Hsien: 1♂, Lushan Spa, 1200 m, 23-24.3.1981, leg. Yoshimoto (coll. Behounek).

Indonesia. Sumatra: 6♂♂, ♀♀, Aek Tarum, Gunung Malayu, Febr.-March, leg. Diehl; 1♂, Dairi-East, 1500 m, 18.4.1981, leg. Diehl; 1♂, Dairi-West, 1200 m, 26.4.1981, leg. Diehl; 4♂♂, ♀♀, Huta Padang, 310 m, 99°11'E 2°48'N, Sept.-Febr., leg. Diehl; 3♂♂, ♀♀, Simalungen, Prapat, Holzweg 2, 1050 m, 28km W Siantar, 2°46'N,98°59'E, Febr.-May, leg. Diehl; 1♂, 1♀, Simalungen, Prapat, Holzweg 2-4, 1150 m, 2°46'N,98°59'E, 21.9.1996, leg. Diehl; 6♂♂, ♀♀, Simalungen, Prapat, Holzweg 3, 1050-1150 m, 2°46'N,98°59'E, April-Nov., leg. Diehl; 2♀♀, Sipirok, April-May, leg. Diehl; 1♂, Simalungen, Sitahoan, 1450 m, 2°40'N,98°55'E, (E.Prapat), 27.9.1981, leg. Diehl; 4♂♂, ♀♀, Straße Sindar Raya, 400 m, 11 km S Sindar Raya, March-June, leg. Diehl; 1♀, Tingi Raya, 15.8.1995, leg. Diehl; 1♂, Sungei Kongus 3, 23.1.1997, leg. Diehl.

Sulawesi: 1♂, Mt. Padamaran, 900-1200 m, Tana Toraja, 4.5.1986; 1♂, Puncak, Palopo, 900-1300 m, 2°55' S, 120°05' E, 25.Jan.1997, native collector leg. (ex coll. Brechlin, coll.Behounek) (Slide Nos. 5086, 5221, Behounek, ♂♂, 5220, Behounek, ♀).

Note. First record for Sumatra and Sulawesi, not reported by Behounek & Thöny (1995). The total number of the Plusiinae species known from Sumatra is now 29.

Distribution. China, India, Himalayas, Sikkim, Nepal, Thailand, Vietnam, Taiwan, Malaysia, Philippines, Indonesia: Sumatra, Sulawesi.



Fig. 25. *Chrysodeixis (Chrysodeixis) minutus* Dufay, 1970, ♂, Vietnam.

Dactyloplusia mutans (Walker, 1865)

List. Spec. Lep. Ins. B. M. 33: 839 (*Plusia*) (Holotypus: Sri Lanka, BMNH, London)

Material examined: Laos. 1♂, Phu Soai Dao, 1250 m, June,1996, leg. Steinke & Lehmann.

Indonesia. Flores: 2♂♂, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17-21.4.1996, leg. R. Brechlin; 1♂ Ranggawatu, Telecom-station, 33 km E Labuhanbajo, 900 m, primary forest, 13.4.1996, leg. R. Brechlin.

Timor: 1♂, (Barat), Prov. Nusa Tenggara Timur, Gunung (Mt.) Mutis (S) 1460 m, Fatumnasi, 21-23.3.1996, leg. R. Brechlin (coll. Behounek).

Note. First record for Laos, Timor and Flores.

Distribution. China, India, Himalayas, Thailand, Vietnam, Laos, Taiwan, Sri Lanka, Indonesia: Sumatra, Java, Bali, Sulawesi, Timor, Flores.

Ctenoplusia (Ctenoplusia) limbirena (Guenée, 1852)

Hist. Nat. Ins. (Lép.) Noct. 2:350 (*Plusia*) (Lectotypus: Madagascar, MNHN, Paris)

Material examined: Indonesia. Timor (Barat), 3♂♂, Prov. Nusa Tenggara Timur, Gunung (Mt.) Mutis (S) 1460 m, Fatumnasi, 21.-23.3.1996, leg. R. Brechlin; 12♂♂, ♀♀, 5 km N Fatumnasi, 1730 m, primary forest, 26.3.1996, leg. R. Brechlin.

Sulawesi, 2♂♂, Rantepao, 1250 m, 6.4.-4.5.1996, leg. Smrcek (coll. Behounek).

Bali, 2♂♂, 5 km N. Batur, 1600 m, 11.1.1999, leg. Cherny (coll. Behounek)

Note. First record for Timor, Sulawesi and Bali.

Distribution. England?, Denmark?, S-Spain, Portugal, Madeira, Morocco, Canary Isles (Tenerife, Gran Canaria, La Palma, Hierro, Gomera), Cape Verde Isl., Azores, Saudi Arabia, India, Sri Lanka, Indochina, Indonesia: Sumatra, Timor, Flores, Sulawesi; widespread in continental Africa, Madagascar, Réunion, Mauritius, St.Helena.

Ctenoplusia (Acanthoplusia) herbuloti Dufay, 1982
Plate 1, fig. 14

Bull. Soc. linn. Lyon, 51(3): 73, fig. 5, 6, (Holotypus: ♂, Philippines, N.Luzon, Monte Santo-Tomas, Baguio, coll. Dufay)

Material examined: Philippines. N. Luzon: 1♂, Ifugao, Banaue, 20 km N Laguna, 1200 m, Sept.-Oct. 1988, leg. Cerny & Schintlmeister; 7♂♂, ♀♀, Mts. Prov. Chatol, 16 km SE Bontoc, 1600 m, Sept.-Oct. 1988, leg. Cerny & Schintlmeister (coll.Behounek) (Slide Nos. 5100, 5114, Behounek, ♂♂, 5115, Behounek, ♀).

Distribution. Philippines, Luzon.

Plusiopalpa adrasta (Felder & Rogenhofer, 1874)

Reise öst. Freg. Novara, 2(2): Plate 110: 35 (*Plusia*) (Type: Indonesia, Sulawesi, coll. BMNH, London)

Material examined: Philippines. N Luzon: 4♂♂, ♀♀, Ifugao, Banaue, 20 km N Laguna, 1200 m, Sept.-Oct.1988, leg. Cerny & Schintlmeister, 1♂, Oct. 1988 – Jan. 1989, leg. Vermolen; 1♂, 1♀, Nueva Vizcaya, Dalton Pass, Santa Fe, 800 m, (secondary bush), 15°07'N 120°36'E, 21.Sept.-17.Oct. 1988, leg. Cerny & Schintlmeister; 2♂♂, Mts.Prov. Chatol, 16 km SE Bontoc, 1600 m, Sept.-Oct. 1988, leg. Cerny & Schintlmeister, 1♂, Quezon, Forest Nat.Park, 250 m, (Flachlandurwald), 14°01' N 120°50' E, 11.Oct. 1988, leg. Cerny & Schintlmeister.

Indonesia. N Bali: 1♂, 1♀, Gilgit, 740 m, (cultivated area), 5. Feb. 1997, leg. Cerny.

Flores: 1♂, Prov. Nusa Tenggara Timur Gunung, 18 km E Labuhanbajo, 200 m, primary forest, 9.12.-22.4.1996, leg. R. Brechlin.

Sumbawa: 1♂, 1♀, (Prov. Nusa Tenggara Barat) Gunung (=Mt.) Tambora (W) 10 km E Tambora, 1020 m, primary forest, 14-15.3.1996, leg. R. Brechlin (coll. Behounek) (Slide No. 5148, Behounek, ♂).

Note. First record for Philippines, Bali, Sumbawa and Flores.

Distribution. Japan, N-India, Himalayas, Nepal, Taiwan, Malaysia, Philippines, Borneo, Indonesia: Sumatra, Java, Bali, Timor, Flores, Sumbawa, Sulawesi; New Guinea, Bismarck-Arch., New Ireland.

Argyrogramma signata (Fabricius, 1775)

Syst. Ent. 608, Nr. 62 (*Noctua*) (Type: India)

Material examined: Philippines. N Luzon: 2♂♂, Ifugao, Banaue, 1000 m, 10.4.1988, leg. Settele, 1♂, 5 km E Banaue, 1200 m, 10.4.1988, leg. Graul; 1♂, 20 km N Laguna, 1200 m, Oct. 1988-Jan. 1989, leg. Vermolen; 2♂♂, Sept.-Oct. 1988, leg. Cerny & Schintlmeister.

Indonesia. Nias: 1♀, vic. Sawo, March 1995, leg. Diehl.

Sumbawa: 1♂, (Prov. Nusa Tenggara Barat) Bima-Airport (Palibelo) 50 m, Sec. Wald, 12.3.1996, leg. R. Brechlin.

Flores: 1♀, Prov. Nusa Tenggara Timur Gunung (=Mt.) Ranaka (E) 3 km S Mano, (18 km SE Ruteng) 1270 m, primary forest, 17.-21.4.1996, leg. R. Brechlin.

Timor: 1♂, Barat, Prov. Nusa Tenggara Timur, Gunung (=Mt.) Mutis (S), 5 km N Fatumnasi, 1730 m, primary forest, 26.3.1996, leg. R. Brechlin (coll. Behounek) (Slide No. 4288, Behounek, ♂).

Note. First records from the Philippines: Nias, Sumbawa, and Flores.

Distribution. Canary Isles, S-China, Hainan, India, Himalayas, Nepal, Sri Lanka, Indochina, Taiwan, Indonesia: Borneo, Sumatra, Nias, Java, Timor, Flores, Sumbawa; Tonga-Is., Cook-Is., Bismarck-Arch., New Ireland, New Caledonia, Australia, widely distributed in Africa south of the Sahara; Madagascar, Comores, Mauritius, Seychelles.

Loboplusia vanderweelei Roepke, 1941

Zool. Meded. Leiden, 23: 27, Plate 2: 8 (Holotypus: ♂, Indonesia, Java, coll. RNH, Leiden)

Material examined: Thailand. 1♂, Nau Prov. Pua Doi Phu Ka, km 35, 1680 m, 18.2.1993, leg. Speidel (coll.Behounek).

Distribution. India, Nepal, Thailand, Vietnam, Burma, Indonesia, Sumatra, Java.

Autographa dudgeoni (Hampson, 1913)

Lep. Phal. B. M. 13: 544, Plate 238: 29 (*Phytometra*) (Holotype: ♂, Bhutan, coll. BMNH, London)

Material examined: Nepal. 1♂, Ganesh Himal, 3 km SE Somdang, 3450 m, 85°13'E, 28°11'N, 25.7.1995, leg Hreblay & Németh (coll. Behounek).

Distribution. Bhutan, Nepal.

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The authors wish to express their gratitude to Mr. R. Brechlin (Pasewalk) Mr. K. Cerny (Zirl), Mr. E. Görgner (Dessau), Mr. M. Graul (Hainichen), Mr. M. Hreblay (Érd), Mr. N. Keil (Dachau), Mr. A. Schintlmeister (Dresden), Mr. W. Speidel (Bonn), Mr. and Mrs. Taschner (Munich), Mr. H. Thöny (Poté) and Mr. T. Witt (Munich) for the Plusiinae-material from Southeast-Asia.
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SPIXIANA	**22**	2	143–147	München, 01. Juli 1999	ISSN 0341-8391

A new species of the genus *Pogonus* Nicolai from Northwestern Australia

(Insecta, Coleoptera, Carabidae, Pogoninae)

Martin Baehr

Baehr, M. (1999): A new species of the genus *Pogonus* Nicolai from Northwestern Australia (Insecta, Coleoptera, Carabidae, Pogoninae). – Spixiana **22/2:** 143-147

Pogonous sumlini, spec. nov. from northwestern Australia is described. A revised key to the depigmented Australian species of *Pogonus* is provided. The new record fills in the final gap in distribution of the genus *Pogonus* all around Australia and demonstrates that virtually all suitable habitats along the coasts of Australia are inhabited by at least one *Pogonus* species.

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Within a small sample of carabid beetles collected by Mr. William D. Sumlin, III, San Antonio, during his research work on Cicindelids in Western Australia, a peculiar new species of *Pogonus* was recognized that is described herein. The new species was collected in the vicinity of Onslow and Port Headland, respectively, at the coast of northwestern Australia. It belongs to a group of large, depigmented species and is in some ways intermediate between *Pogonus hypharpagoides* Sloane from southern Australia and *P. variabilis* Moore from tropical northern Australia. It is the first *Pogonus* species detected in the northwestern part of Western Australia between Murchison River in the south and the southern border of the Kimberleys in the north. A revised key to the depigmented Australian *Pogonus* is provided that includes all species described since Moore's paper of 1977 and replaces the keys of Baehr (1984), Moore (1991) and Baehr (1997). For the pigmented species my recent key (Baehr 1997) still applies, though the reader should be aware that Peter Hudson (Adelaide) soon will describe a new pigmented species from Western Australia (material seen by me).

Measurements

Measurements were taken using a stereo microscope with an ocular micrometer. Length has been measured from apical margin of labrum to apex of elytra, measurements, therefore, may slightly differ from those of other authors. Length of pronotum was taken along the midline, width of base between the posterior lateral angles.

Location of material

The holotype is donated to the Western Australian Museum, Perth (WAM), the paratype is kept in the working collection of the author (CBM) at Zoologische Staatssammlung München.

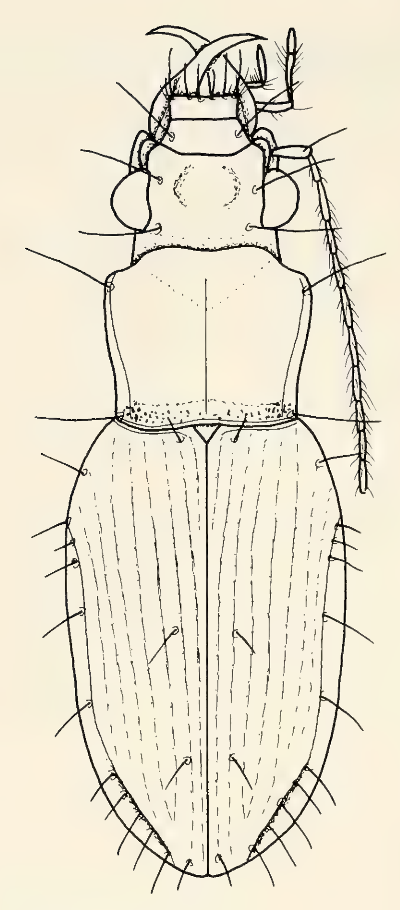


Fig. 1. *Pogonus sumlini*, spec. nov. Habitus. Length: 9 mm.

Pogonus sumlini, spec. nov.
Figs 1, 2

Types. Holotype: ♂, AUSTRALIA: W.A. Onslow, 21°38'59"S, 115°07'29"E, 26.XI.1997, Sumlin & Shatterly, mangrove salt flats (WAM). – Paratype: 1♂, AUSTRALIA: W.A. Port Hedland – Gray St., 20°19'42"S, 118°39'13"E, 19.XI.1997, Sumlin & Gage, magrove flats @ lights (CBM).

Diagnosis. Large, rather depressed, depigmented species, distinguished from both most similar species *P. hypharpagoides* Sloane and *P. variabilis* Moore by wider, more oval-shaped and more depressed elytra with conspicuously explanate lateral margins, and rather quadrate pronotum with barely sinuate lateral margins, almost rectangular basal angles, conspicuously bisinuate basal border, and characteristically widened basal part of marginal channel. It is further distinguished from *P. hypharpagoides* by longer mandibles, longer and more hirsute penultimate maxillary palpomere, longer antenna, less convex pronotum, distinct basal pronotal puncturation, more complete and deeper elytral striation, and distinct puncturation of striae. From *P. variabilis* it is further distinguished by more depressed eyes, shallower and less complete elytral striation, and finer puncturation of striae.

Description

Measurements. Length: 9.1-10.0 mm; width: 3.3-3.8 mm. Ratios. Width/length of pronotum: 1.12-1.13; width base/apex of pronotum: 1.04-1.06; width of pronotum/width of head: 1.19-1.20; length/width of elytra: 1.56-1.60; width elytra/pronotum: 1.36-1.40.

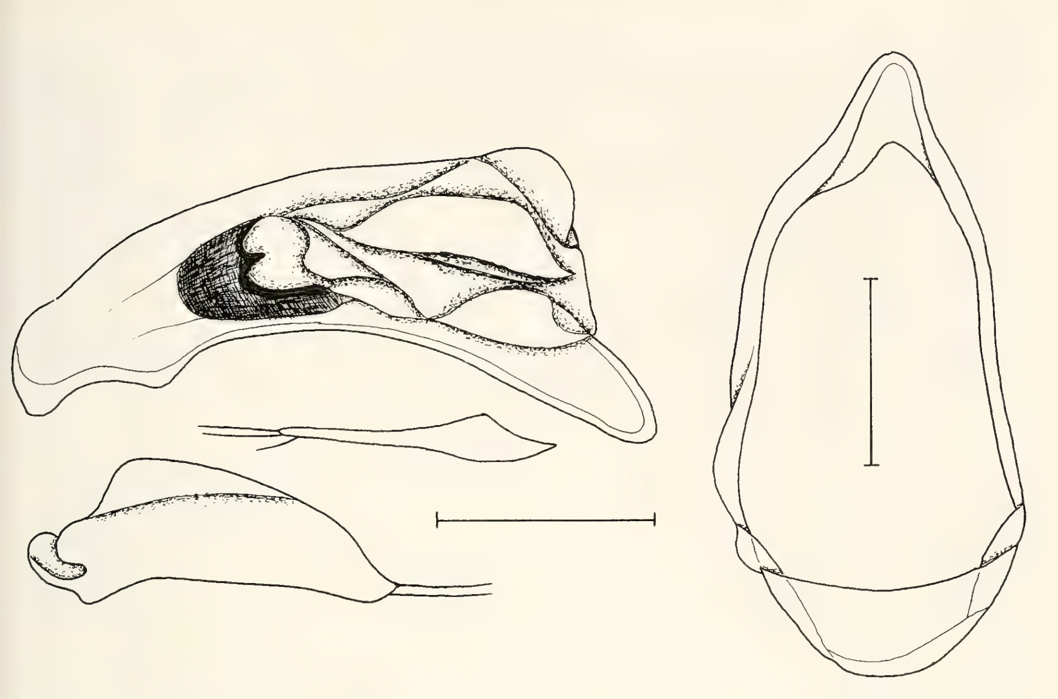


Fig. 2. *Pogonus sumlini,* spec. nov. ♂ genitalia. Scales: 0.5 mm.

Colour. Uniformly light reddish, labrum, palpi, antennae, and legs yellow. Lower surface yellow-red, epipleurae light yellow. Eyes blackish, mandibles brown.

Head. Large, convex, slightly narrower than pronotum. Eyes large though rather depressed, laterally not much projecting, posteriorly not enclosed. Labrum short and wide, apex slightly concave. Mandibles very elongate, somewhat decussate, apex strongly incurved. Palpi very elongate, markedly hirsute. Clypeus and frons in middle convex, frontal furrows very short, shallow, frons behind clypeal suture with some shallow, irregular impressions, frons also in middle with small ovalish impression. Antennae rather elongate, surpassing base of pronotum by about two antennomeres, pilose from middle of 3rd antennomere. Surface rather glossy, impunctate, with fine, rather superficial, isodiametric microreticulation.

Pronotum. Slightly wider than long, quadrate, widest in anterior quarter about at position of anterior lateral seta. Apex remarkably produced beyond anterior angles, in middle slightly excised. Anterior angles widely rounded off. Lateral border faintly rounded in apical half, then gently sinuate in front of the basal angles. Marginal channel anteriorly narrow, suddenly widened and slightly explanate towards base. Base in middle bisinuate, laterally remarkably oblique, hence, basal angles angulate though very wide. Apex unmargined, base margined, base in front of margin transversely swollen. Anterior transverse sulcus barely indicated, median line very shallow, abbreviated at apex and base, basal transverse sulcus shallow though distinct. Apex with some shallow corrugations at the site of anterior transverse sulcus, base coarsely punctate-striolate, laterally even rather coriaceous. Basal grooves rather shallow. Disk with finest and highly superficial traces of microreticulation only, extremely finely punctulate and striolate, highly glossy.

Elytra. Rather elongate, wide, strongly depressed, markedly oval-shaped. Humeri sharply projecting, strongly angulate, tightly adpressed to base of pronotum. Lateral margin gently convex to anterior fourth, then faintly narrowed and slightly oblique. Marginal channel narrow, even more narrowed from between 3rd and 4th anterior marginal pore. Margin explanate from anterior quarter backwards. Striation almost complete, though external striae abbreviated at base. Striae distinct, though external striae barely impressed, internal striae more coarsely punctate in anterior three quarters. 8th stria remarkably deepened and widened in apical fourth. Intervals depressed to very feebly convex. 3rd interval with two setiferous punctures, one at middle adjacent to 3rd stria, the other in posterior third

attached to 2nd stria. Submarginal pores consisting of 4(-5) pores in anterior group, 4-5 pores in posterior group, and one or two intercalar pores between. Microreticulation rather superficial, isodiametric. Wings fully developed.

Legs. Moderately elongate. Tarsi rather elongate, 1st tarsomere of metatarsus almost as long as both following tarsomeres. Metatrochanter (in males!) extremely elongate, c. two third of length of femur, apex acute, incurved. In males elongate 1st and short 2nd tarsomeres biseriately squamose, squamae remarkably elongate.

♂ genitalia (Fig. 2). Genital ring wide, triangular, rather symmetric. Aedeagus short and compact, laterally depressed, slightly asymmetric, lower surface regularly curved, apex rather elongate, rounded at tip, slightly turned to right side. Internal sac with a coiled, circular, heavily sclerotized plate near base. Right paramere narrow, slightly shorter than left, with two elongate and one additional short apical setae, the latter situated below the longer ones. Left paramere large, rather quadrangular, suddenly narrowed to obtusely angulate apex, with two elongate apical setae.

♀ genitalia. Unknown.

Variation. Some variation of size, relative width of elytra, and distinctness of striation und punctuation of striae noted.

Habits. The two specimens were collected at light in mangrove salt flats near Port Hedland and Onslow, respectively, which is exactly the same habitat that was recorded for the related *Pogonus variabilis* Moore of the Kimberleys, far Northern Territory, and far northern Queensland.

Distribution. Northwestern Australia south of the Kimberleys, in the vicinity of Port Hedland and Onslow.

Etymology. The name is a patronym in honour of the collector, Mr. Willam D. Sumlin, III.

Relationship. Judging from habitus, the closest relative of the new species seems to be *P. hypharpagoides* Sloane from inland salt lakes of the Lake Eyre basin in South Australia. The northern *P. variabilis* Moore is perhaps more remotely related, although it inhabits exactly the same tidal habitat as *P. sumlini*.

Recognition

For recognition of this conspicuous species the most recent key (Baehr 1997) has been partly revised. Since nothing has been altered for the metallic green or black Australian species of *Pogonus*, for those species the mentioned key should be further used as far as the new species to be described by Peter Hudson is not at hand. Therefore, the present key begins at couplet 6, that heads the fully depigmented Australian species.

Revised key to the depigmented Australian species of the genus *Pogonus* Nicolai

6. Large species (body length >9 mm); **either** pronotum distinctly sinuate in front of basal angles and base about as wide as apex, **or** pronotum rather quadrate with characteristicallly bisinuate base, and elytra wide, oval-shaped, and depressed with wide, explanate lateral margin. Northern Australia from northwestern Queensland to Exmouth Gulf, coastal and along tidal rivers .... 7.

– Smaller species (body length <8.5 mm); pronotum distinctly sinuate or not in front of basal angles; but when distinctly sinuate, then base markedly narrower than apex; when not sinuate, then elytra not remarkably wide, oval-shaped, and depressed; and with narrower, not explanate lateral margin. Inland in southern half of Australia .... 8.

7. Pronotum distinctly sinuate in front of basal angles, lateral margin not explanate at base; eyes convex, laterally markedly protruding; elytra less wide and depressed, lateral margin not explanate, striation deeper and more complete, striae distinctly punctate. Northern Australia from northwestern Queensland to the Kimberleys .... *variabilis* Moore

– Pronotum rather quadrate, lateral margin conspicuously explanate at base; eyes depressed, laterlally little protruded; elytra wide and depressed, lateral margin explanate, striation shallow and laterally incomplete, striae more finely punctate. Coast of Northwestern Australia south of Great Sandy Desert .... *sumlini*, spec. nov.

8. Elytra broad; pronotum distinctly sinuate in front of basal angles and base markedly narrower than apex; left paramere with two apical setae, right paramere with a single apical seta. South Australia, Lake Eyre Basin .... *gilesi* Moore

– Elytra narrow; pronotum either not distinctly sinuate in front of basal angles or base about as wide as apex; left paramere with three, right paramere with two apical setae .... 9.

9. Large, convex species (body length 7.2-8.2 mm); head large, pronotum dorsally and laterally markedly convex. South Australia, Lake Eyre Basin .... *hypharpagoides* Sloane

– Smaller, more depressed species (body length <6.5 mm); head smaller, pronotum dorsally more depressed, laterally less convex .... 10.

10. Pronotum rather quadrate, lateral margin evenly curved from apex to base, widest in middle; elytral striae shallow, only three inner striae distinct, microreticulation conspicuous. Interior of Western Australia .... *diplochaetoides*, spec. nov.

– Pronotum more narrowed to base than to apex, widest in anterior third, lateral margin not evenly curved; elytral striae deep, at least five inner striae distinct, microreticulation inconspicuous. South Australia, Lake Eyre Basin .... 11.

11. Larger species (body length 5.2-6.4 mm); lateral margin of pronotum convex to base, basal angle obtuse, little projecting. Lake Eyre .... *grossi* Moore

– Smaller species (body length 4.1-4.9 mm); lateral margin of pronotum straight or slightly concave in front of base, basal angle almost right, distinctly projecting. Vicinity of Lake Gairdner and Island Lagoon .... *saskiae*, spec. nov.

Acknowledgements

My sincere thanks are due to Mr. Willam D. Sumlin, III, San Antonio for kindly submitting the very interesting sample of carabids collected by himself which, inter alia, yielded the new *Pogonus* described herein.

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13. Streit, B., Städler, T. & C. M. Lively: Evolutionary Ecology of Freshwater Animals. – Public Relations, Birkhäuser Verlag AG, Basel, Berlin, Boston, 1997, 384 pp. ISBNN 3-7643-5694-4.

Evolutionsökologie umfaßt Aspekte der Populationsstruktur, Beziehungen der Biocoenose zu den Trophieebenen, Biologie und Lebensstrategien sowie Reprodiktionszyklen, die aus der Sicht der Evolutionsbiologie hinterfragt werden. Der räumlich eingegrenzte Bereich der Süßwassersysteme, große Seen wie kleine Pfützen, erleichtert den Einblick in die Lebensgemeinschaft, was zum Übergewicht der ökologischen Untersuchungen und Populationsbiologischen Analysen in diesen Ökosystemen führte. Dieses Buch dokumentiert zusammenfassende Informationen der diversen Süßwasserfauna mit kritischen Anmerkungen in Abwägung von Denkansätzen, Synthesen und Grundlagenerhebungen. Hierbei werden als Beispiele Bryozooen, Rotatorien, Cladoceren, Mollusken, Fische und andere Gruppen für tiefergehende evolutionsbiologische Fragestellungen herangezogen. Der teilweise vermitteltete freilandökologische Bezug soll vor allem Studenten und Bearbeiter der Ökologie, Limnologie, Populationsbiologie und Evolutionsbiologie ansprechen. Zwölf Einzelbeiträge mit unterschiedlichen Schwerpunkten zeigen einen Stand derzeitiger Untersuchungen auf diesem Forschungssektor, die jedoch stärker übergreifende Aspekte nicht aufgreifen. Jeder der Artikel enthält ein umfangreiches Literaturverzeichnis, das zur besonderen Vertiefung dieses interessanten Themenkomplexes anregt. E.-G. Burmeister

14. Rosing, N.: Deutsche Nationalparks. – Tecklenborg Verlag 1997, 199 pp.

Die hervorragenden Bilder und Motive des bekannten Fotografen und Autors dieses Buches stehen im Zentrum dieses Buches, das den deutschen Nationalparks gewidmet ist. Dabei werden die 12 inzwischen eingerichteten Schutzzonen näher vorgestellt, wobei einige Areale in Parks aufgeteilt werden, obwohl sie den gleichen Lebensraumtyp aufweisen. Bei dieser Präsentation steht nicht der Park in seiner Funktion im Vordergrund sondern das Naturerlebnis und beispielhaft die Tier- und Pflanzenwelt. Es kommt demnach nicht auf eine Aufzählung von besonderen Arten oder Formationen sondern auf wenige einprägsame Grundfesten des Schutzgebietes. Die bestechenden Bilder sprechen dabei eine deutliche Sprache. Aber auch kritische Stellungnahmen zur Belastung etwa des Grundwassers und der anteiligen Landnutzung durch Land- und Forstwirtschaft werden hier vorgetragen. Der Begleittext ist ebenso beispielhaft dokumentierend wie das Bildmaterial. Insgesamt ist dieser Bildband Anreiz zum Besuch dieser Reste natürlicher oder, auf mitteleuropäische Verhältnisse besser übertragen, naturnaher Landschaften, deren Erhalt vordringliches Ziel zukünftiger Generationen sein muß, auch wenn immer wieder Angriffe von außen gegen den Schutzstatus erfolgen. Daß Nationalparks nicht nur in Afrika zum Besuch einladen, sondern auch in unseren Breiten Natur erleben lassen, daß Naturschutz nicht nur in den tropischen Wäldern Südamerikas notwendig ist, sondern auch vor der Haustür, zeigt dieses Buch.

E.-G. Burmeister

15. Berenbaum, M. R.: Blutsauger, Staatsgründer, Seidenfabrikanten. Die zwiespältige Beziehung von Mensch und Insekt. – Spektrum Akademischer Verlag Heidelberg, Berlin, Oxford, 1997, 526 pp.

Diese Übersetzung der 1995 erschienenen amerikanischen Orginalausgabe ermöglicht es jetzt auch, ein breites Publikum im deutschen Sprachraum über die Wunderwelt der Insekten in Staunen zu versetzen. Besonderer Dank gilt hier auch dem Übersetzer, der den allgemein verständlichen Stil der Orginalausgabe übernommen hat und einfühlsam und Begeisterung vermittelnd die "Insektengeschichten" erzählt. Hier werden nicht nüchtern wissenschaftliche Details vermittelt, sondern im Stile Henrie Fabres die Leistungen der Insekten und ihre Lebensgeschichten auf einer Bühne präsentiert, die für alle Leserkreise aufgebaut wurde und nach dem Fall des Vorhanges ein Publikum zurückläßt, das nicht nur staunt sondern auch in weiten Teilen Insekten bewundert und lieben gelernt hat. Neben der anschaulichen Wissensvermittlung über die Kerbtiere, ihre systematische Zuordnung, ihre Anatomie, ihr Verhalten , mit Instinkt vielfach abgetan, werden vor allem die Kontakt- und Konfliktbereiche mit den Menschen in den Vordergrund gerückt, so daß hier auch zum Verständnis der Sechsbeiner beigetragen wird. Aber auch der zweibeinige "dominerende" im Vergleich recht junge Mitbewohner dieses Planeten kann über sich selbst Erfahrungen sammeln. Verschiedenste Lebensformtypen mit ihren Ansprüchen stehen hier stellvertretend für das unüberschaubare Heer dieser Gliederfüßler, ihre Nahrungswahl, ein Spektrum vom Nahrungsmittelverlust bis zum Leichenschmaus, die Nutzung des Menschen selbst als Nahrungsquelle und beide Parteien kriegführend sich gegenüberstehend, werden dokumentiert. Die Würdigung der Insekten steht am Ende dieser Zusammenschau, wobei die Basis des Broterwerbs für den Entomologen bzw. die Entomologin, wie die Autorin selbst, nicht vergessen wird. Ein Buch, das "man" gelesen haben muß und das manche trockene zoologische Vorlesung ohne Informationsverlust in eine spannende einprägsame Szenerie verwandeln könnte. E.-G. Burmeister

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New Species of *Triplocania* Roesler from Mexico, Central and South America

(Insecta, Psocoptera, Ptiloneuridae)

Alfonso Neri García Aldrete

García Aldrete, A. N. (1999): New species of *Triplocania* Roesler from Mexico, Central and South America (Insecta, Psocoptera, Ptiloneuridae). – **Spixiana 22/2:** 149-166

Ten new species of *Triplocania* Roesler, and the male of *T. umbrata* New, are described and illustrated. The new species are from Mexico (one), Belize (three), Brazil (one), Colombia (one), and Peru (four). The male of *T. umbrata* was collected in Peru. *Triplocania* is now known to include 24 species, ranging from Puebla, Mexico (19°56'N, 97°57'W) to Nova Teutonia, Brazil (27°11'S, 52°23'W).

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Introduction

Triplocania Roesler (1940) is one of six genera in the epipsocete family Ptiloneuridae, the closest genera to it being *Perucania*, New & Thornton (1988) and *Euplocania* Enderlein (1910). These three genera are relatively homogeneus in terms of genitalic characters and, as well as the other ptiloneurids, are diagnosed mostly on basis of wing venation differences. Conforming to the diagnosis of the family of Mockford (1993), *Euplocania* presents the fore wing M 4-branched, whereas both *Perucania* and *Triplocania* have the fore wing M 3- branched. The former differs from the latter in having the fore wing pterostigma long, shallow, with almost the same width anteriorly and posteriorly, and with the areola postica very long and shallow. The purpose of this paper is to describe ten new species in the genus, and to describe the male of *T. umbrata* New, that was known from females only. With the above, the number of species is raised to 24, ranging from Puebla, Mexico (19°56'N, 97°57'W) to Nova Teutonia, Brazil (27°11'S, 52°23'W). The presently known species of *Triplocania* (Tab. 1), occur in Mexico, Guatemala, Belize, Costa Rica, Bolivia, Colombia, Peru, and Brazil, this country being the most species rich, with 11 out of 24 species (45.8 %).

The material studied consists of 37 specimens, that belong in the following institutions: Smithsonian Institution, Washington, D.C. (SIC); The Natural History Museum, London (NHM); and the National Insect Collection housed at the Instituto de Biología, UNAM, Mexico City (NIC).

The specimens studied were dissected in 80 % alcohol, and their parts were mounted in Euparal or in Balsam of Canada. The colour was recorded on the specimen in 80 % alcohol, prior to the dissection, under a stereoscopic microscope and illuminated with yellow light. Measurements were taken on parts mounted on slides, under the compound microscope, with a filar micrometer whose measuring unit is 1.36 microns for wings and 0.53 microns for other parts. The following abbreviations stand for lengths of parts measured, or counted: FW = right fore wing, HW = right hind wing, F = right hind femur, T = right hind tibia, t_1, t_2, t_3 = right hind leg tarsomeres, ctt_1 = No. of ctenidobothria on t_1, $f_1...f_n$ = rigth antenna flagollomeres 1...n, Mx4 = fourth segment of right maxillary palp, IO = minimum

distance between compound eyes, D = antero-posterior diameter of right compound eye, d = transverse diameter of right compound eye. The measurements are given in microns, and the scales of the illustrations are in mm.

Triplocania bifida, spec. nov. (♂)
Figs 1-6

Types. Holotype: ♂, Peru, Madre de Dios, Río Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 290 m., 12°50'S, 69°17'W. Smithsonian Institution Canopy Fogging Project. T. L. Erwin et al. 7.III.1984. 02/02/076 (SIC).

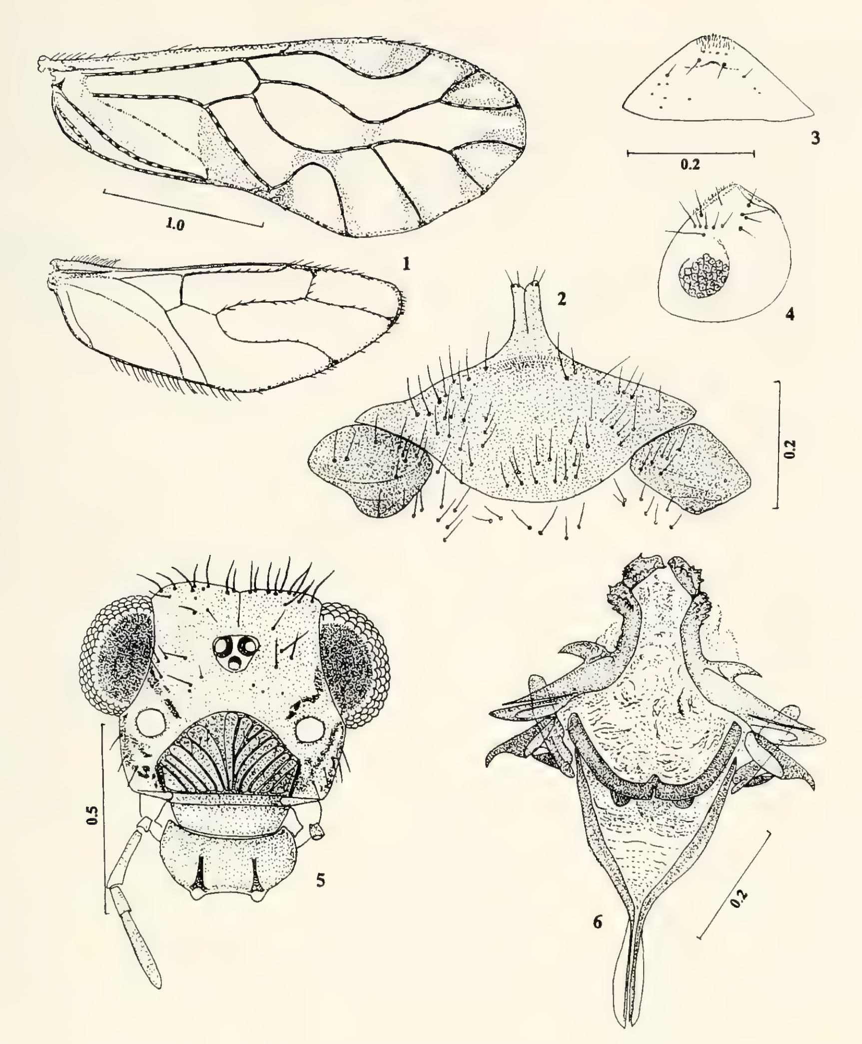
Description

Colour. Brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Head pattern see Fig. 5. Tibiae with distal ends dark brown. FW mostly hyaline, pterostigma brown, with a clear fenestra in the middle; setae of veins arising from brown areolae; large brown spots on veins, from R_{2+3} to Cu_{1b}; a brown spot between Rs and branching of M and between apex of areola postica and M, and a brown area along Cu_1 and touching Cu_2; anterior end of wing pale brown. HW hyaline.

Morphology. Fore wings pterostigma long, narrow anteriorly, wide posteriorly as illustrated (Fig. 1): Rs much longer than stem of M, curved, branching posteriorly into short R_{2+3} and R_{4+5}. M_1 and M_2 short. Areola postica tall, with round apex (Fig. 1). Hypandrium (Fig. 2), a central, broad sclerite, rounded anteriorly, with a stout, posterior projection deeply cleft in the middle, flanked by large sclerites on antero-lateral ends; setae as illustrated. Phallosome (Fig. 6), with basal arms slender, V-shaped; posteriorly with symmetric, complex sclerites, two small, acuminate ones, two elongate divided anteriorly and posteriorly blunt, and two large, posterior ones, each with an acuminate projection mesally on outer edge, and distally denticulate. Paraprocts broad (Fig. 4), with elongate field of short setae along posterior edge, other setae as illustrated. Sensory fields with 24-26 trichobothria on small basal rosettes. Epiproct (Fig. 3) wide basally, with sides converging towards a rounded apex; a field of short setae next to posterior margin, other setae as illustrated.

Table 1. Species of *Triplocania* and their distribution.

1.	*T. ariasi* New	Brazil (Reserva Ducke)
2.	*T. bifida* García Aldrete	Peru (Río Tambopata Reserve)
3.	*T. brailovskyana* García Aldrete	Mexico (Zacatlán, Puebla)
4.	*T. calcarata* New	Brazil (Reserva Ducke)
5.	*T. caudata* New	Brazil (Reserva Ducke)
6.	*T. caudatoides* García Aldrete	Peru (Río Tambopata Reserve)
7.	*T. cervantesi* García Aldrete	Belize (Chiquibul Forest Reserve)
8.	*T. chiquibulensis* García Aldrete	Belize (Chiquibul Forest Reserve)
9.	*T. chulumanensis* Williner	Bolivia (Yungas)
10.	*T. colombiana* García Aldrete	Colombia (Curicha)
11.	*T. furcata* New	Brazil (Matto Grosso)
12.	*T. immaculata* New	Brazil (Reserva Ducke)
13.	*T. lucida* Roesler	Brazil (Nova Teutonia)
14.	*T. lunulata* New	Brazil (Reserva Ducke)
15.	*T. magnifica* Roesler	Brazil (Nova Teutonia)
16.	*T. marginepicta* Roesler	Costa Rica (Vara Blanca)
17.	*T. obscura* García Aldrete	Belize (Chiquibul Forest Reserve)
18.	*T. reflexa* Roesler	Brazil (Nova Teutonia)
19.	*T. robusta* García Aldrete	Peru (Río Tambopata Reserve)
20.	*T. rondoniensis* García Aldrete	Brazil (Rondonia)
21.	*T. spinosa* Mockford	Mexico (Los Tuxtlas, Veracruz) Guatemala (Tikal)
22.	*T. tambopatensis* García Aldrete	Peru (Río Tambopata Reserve)
23.	*T. umbrata* New	Brazil (Reserva Ducke) Peru (Río Tambopata Reserve)
24.	*T. vazquezae* García Aldrete	Mexico (Los Tuxtlas, Veracruz)



Figs 1-6. *Triplocania bifida*, spec. nov. ♂. **1.** Fore and hind wings. **2.** Hypandrium. **3.** Epiproct. **4.** Left paraproct. **5.** Front view of head. **6.** Phallosome. Figs 3 and 4 to scale of fig. 2.

Measurements. FW: 3074, HW: 2170, F: 815, T: 1271, t_1: 590, t_2: 67, t_3 106, ctt_1: 19, Mx4: 205, f_1: 432, f_2: 312, IO: 412, D: 320, d: 185, IO/D: 1.28.

Etymology. The specific name refers to the posterior projection of the hypandrium, divided in two parts.

Discussion. This species presents the same hypandrial plan as *T. robusta*, spec. nov., *T. rondoniensis*, spec. nov., *T. tambopatensis*, spec. nov., *T. lucida* Roesler, 1940 and *T. umbrata* New, 1980, the male of which is here described and with which it also shares the short R_{2+3} - R_{4+5}, short M_1 - M_2, and the FW pigmentation pattern.

Triplocania brailovskyana, spec. nov.

Figs 7-15

Types. Holotype: ♂, Mexico, Puebla, Zacatlán (Río San Pedro), 18.VIII.1994, beating vegetation, H. Brailovsky & E. Barrera (NIC). – Paratypes: ♀ allotype, 1♂, 2♀♀, same data (NIC).

Description

Female. Colour. Ground colour creamy white, with dark brown areas in head, thorax and abdomen, as indicated below. Compound eyes black, ocelli hyaline, with large, ochre centripetal crescents. Maxillary palps creamy white. Mx4 with apex brown. Head pattern (Fig. 12). Antennae pale brown, flagellomeres with apex white and a brown band next to it. Tergal lobes of meso- and metathorax brown; brown spots irregularly distributed on pleurae, mesopleurae more pigmented than pro- and metapleurae. Fore wing hyaline, pterostigma with brown band proximally, veins brown, with large pigmented spots on ends of R_{2+3}, R_{4+5}, M_1-M_3, Cu_{1a}, Ca_{1b}, and small spot on end of 1A. Hind wing hyaline, with brown spots on ends of R_{2+3}, R_{4+5}, M_1 and Cu_2. Legs creamy white, apices of coxae and tibiae brown, proximal and distal ends of femora brown; t_2 and t_3 brown. Abdomen creamy white, with conspicuous brown bands on sternites 2-5. Genital segments brown.

Morphology. Fore wing pterostigma shallow, elongate, Rs almost straight, areola postica wide based, rounded (Fig. 7). Subgenital plate broad, setose, rounded posteriorly, with thick brown band along lateral and posterior margins (Fig. 14). Ovipositor valvulae (Fig. 10): V_1 short, slender, V_{2+3} wide based, narrowing distally, distributed as illustrated; with two basal setae and five-six mesal setae distributed as illustrated, distal portion slender, approximately straight, spiculate distally (Fig. 10). 9th sternum broad, with a transverse, thick, curved band, as illustrated (Fig. 10). Paraprocts (Fig. 8), wide based, rounded posteriorly; sensory fields with 32–34 densely packed trichobothria on basal rosettes; setae as illustrated. Epiproct (Fig. 9) wide at base, narrowing posteriorly to round apex; setae as illustrated.

Measurements. FW: 6465, HW: 4360, F: 1500, T: 2680, t_1: 1106, t_2: 91, t_3: 182, ctt_1: 44, Mx4: 378, f_1: 1151, f_2: 1192, f_3: 1022, IO: 607, D: 394, d: 262.

Male. Colour. Same as in female.

Morphology. Hypandrium (Fig. 15), a large, transverse sclerite, with a stout, wide based, distally blunt posterior extension on each side, with large setae as illustrated, and one large setose sclerite on each side. Phallosome (Fig. 13), with slender apodemes and symmetric, large, deeply sclerotized posterior sclerites, the anterior most acuminate on both ends and the posteriormost stout with inner edge serrate. Paraprocts (Fig. 11) elongate, semi elliptic, with dense mesal field of short setae; other setae as illustrated, sensory fields with 26-28 trichobothria on basal rosettes. Epiproct (Fig. 11) wide based, posteriorly rounded, with a field of short setae along posterior margin, two mesal macrosetae and a central anterior field with 8 short setae.

Measurements. FW: 6374, HW: 4178, F: 1506, T: 2738, t_1: 1122, t_2: 109, t_3: 165, ctt_1: 44, Mx4: 383, f_1: 1325, f_2: 1349, f_3: 1186, f_4: 926, IO: 583, D: 438, d: 316.

Etymology. The specific name is an adjectival genitive, after the last name of Dr. Harry Brailovsky, of the Instituto de Biología, UNAM, hemipterologist to whom the species is dedicated for collecting and donating the specimens for study.

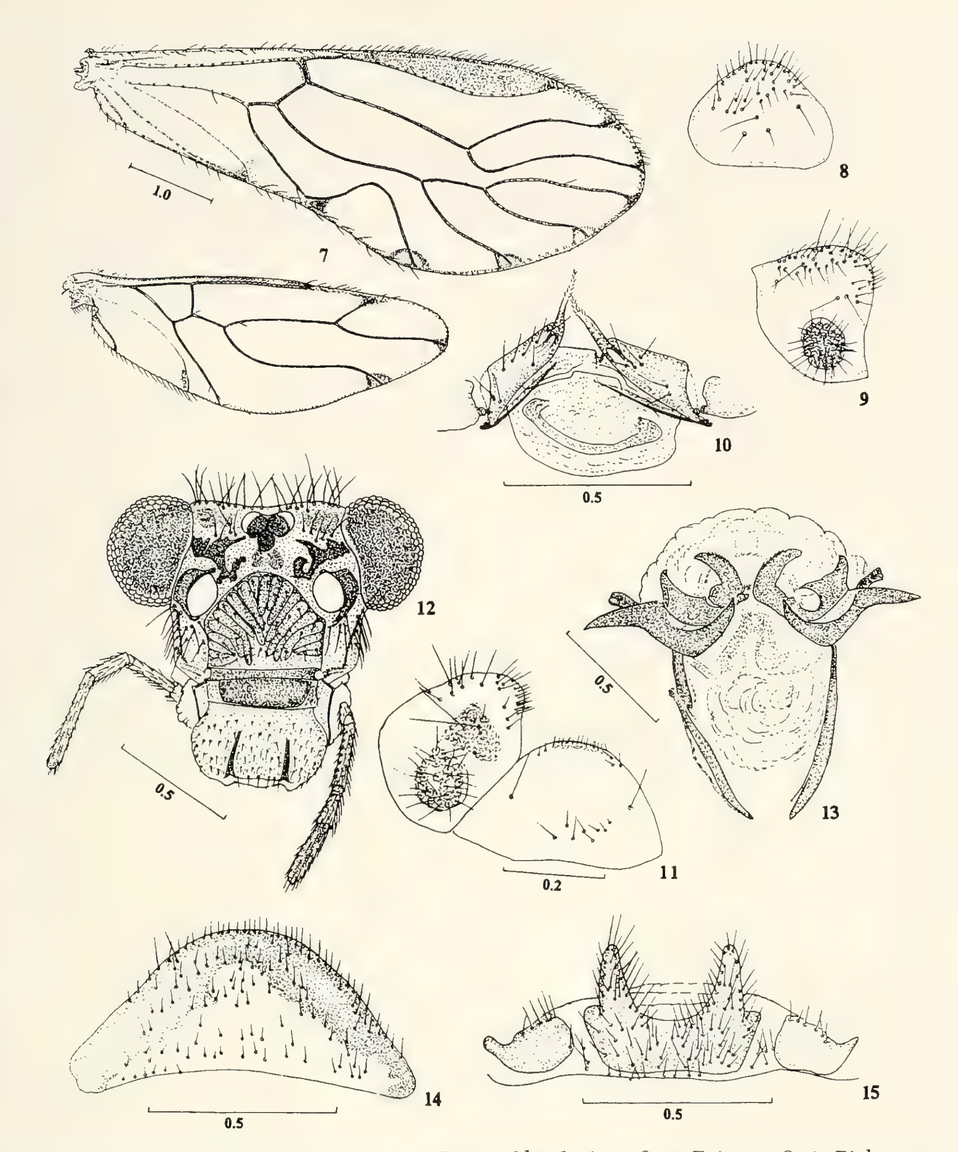
Discussion. *T. brailovskyana*, spec. nov. is closest to *T. spinosa* Mockford (1957) and to *T. vazquezae* García Aldrete (1995), both occurrying in Mexico. In the three species the hypandrium has stout posterior projections, although in *T. spinosa* the side sclerites to the central piece are not apparent. In the three species the phallosome is structured in the same general plan, with slender apodemes and posterior, symmetric, complex sclerites. In the females, the subgenital plates are simple, V_1 are slender and separate from $V_2 + V_3$, and the 9th sternum is constituted by a distinct, thick plate. The three species are separable on fore wing pattern, head pattern, and genitalic details of both sexes. *T. brailovskyana* constitutes the third species of the genus to be documented in Mexico.

Triplocania caudatoides, spec. nov. (♂)

Figs 16-20

Types. Holotype: ♂, Peru, Madre de Dios, Río Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 290 m, 12°50'S, 69°20'W. Smithsonian Institution Canopy Fogging Project, T. L. Erwin et al. 14.IX.1984, 01/02/062 (SIC).

Note. A female, apparently of the same species was taken at the same locality on 4.V.1984 (01/02/054); the specimen is mutilated, lacking the abdomen and most of the legs; it is not described on this account.

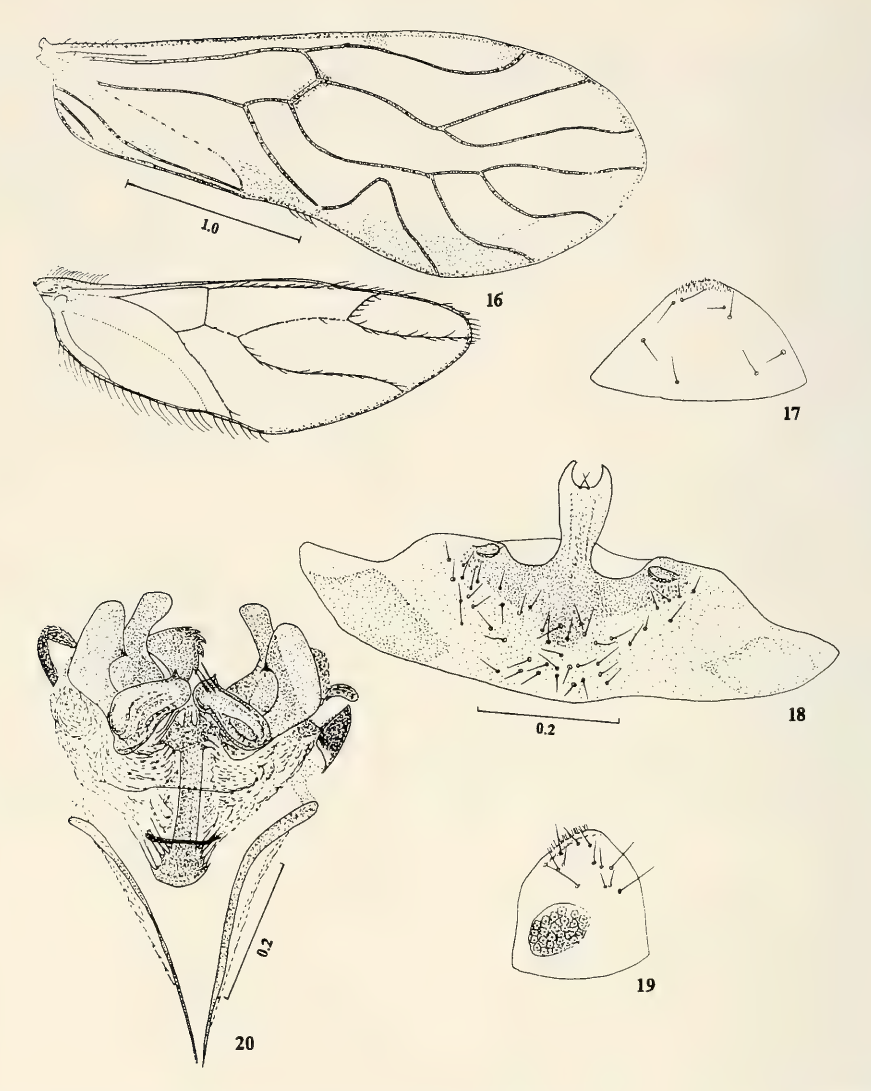


Figs 7-15. *Triplocania brailovskyana*, spec. nov. ♂. **7.** Fore and hind wings, ♀. **8.** Epiproct, ♀. **9.** Right paraproct, ♀. **10.** Ovipositor valvulae and 9th sternum, ♀. **11.** Right paraproct and epiproct, ♂. **12.** Front view of head, ♂. **13.** Phallosome, ♂. **14.** Subgenital plate, ♀. **15.** Hypandrium, ♂. Figs 8 and 9 to scale of fig. 11, fig. 13 to scale of fig. 15.

Description

Colour. Body brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Maxillary palps pale brown; apex of Mx4 dark brown. Antennae pale brown. FW mostly hyaline, veins brown; pterostigma with a brown band proximally and distally; apices of veins with dark brown spots, from R_{2+3} to Cu_{1b}. A pale brown band along wing margin from cell R_{2+3} to Cu_2, and extending upwards along Cu_1. Area of wing base between margin and Cu_2 pale brown. HW hyaline (Fig. 16).

Morphology. FW pterostigma elongate, narrow anteriorly. R_{2+3} straight, veins R_{4+5} to M_3, sinuous; areola postica wide based, tall, with narrow apex and slightly slanted posteriorly (Fig. 16). Hypandri-

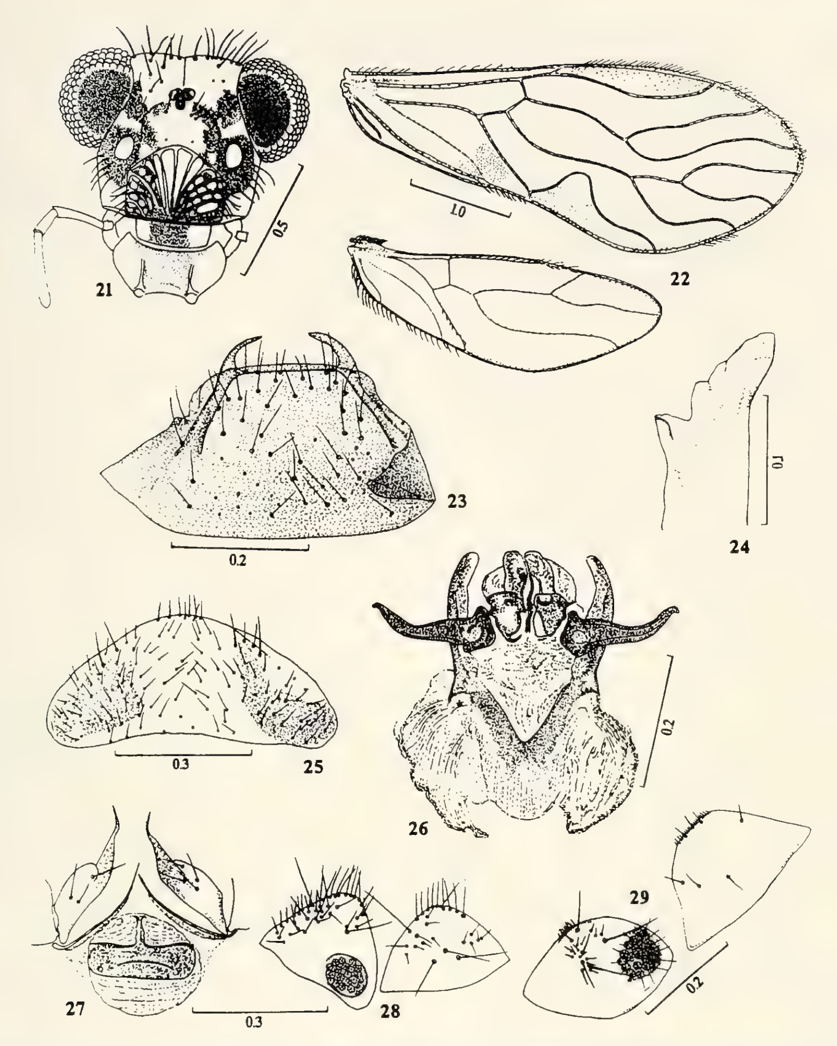


Figs 16-20. *Triplocania caudatoides*, spec. nov. ♂. **16.** Fore and hind wings. **17.** Epiproct. **18.** Hypandrium. **19.** Left paraproct. **20.** Phallosome. Figs 17 and 19 to scale of fig. 18.

um wide, setae as illustrated (Fig. 18), a central, well defined pigmented area and two elongate, pigmented areas, one on each antero-lateral extreme (Fig. 18). Central area projected posteriorly to form a tongue, deeply concave distally; a small, elongate protuberance on each postero-lateral margin of central area. Phallosome (Fig. 20) V–shaped, endophallic sclerites asymmetric, constituted by a stout longitudinal shaft, with three pairs of stout sclerites posteriorly and a single, broad, dentate sclerite. Paraprocts (Fig. 19) stout, broad, setose, with a field of short setae along inner margin, posteriorly. Epiproct (Fig. 17) wide basally, with sides converging to a rounded apex; setae as illustrated, and a field of short setae transversely, near posterior margin.

Measurements. FW: 3246, HW: 2289, F: 824, T: 1309, t_1: 558, t_2: 63, t_3: 109, ctt_1: 22, Mx4: 164, f_1: 833, f_2: 318, IO: 359, D: 326, d: 211, IO/D: 1.10.

Etymology. The specific name *caudatoides* means "similar to *caudata*" and refers to the close relationship of this species to *T. caudata* New.



Figs 21-29. *Triplocania cervantesi*, spec. nov. ♂., ♀. **22.** Fore and hind wings, ♀. **23.** Hypandrium, ♂. **24.** Apex of right lacinia, ♀. **25.** Subgenital plate, ♀. **26.** Phallosome, ♂. **27.** Ovipositor valvulae and 9th sternum, ♀. **28.** Right paraproct and epiproct, ♀. **29.** Right paraproct and epiproct, ♀.

Discussion. This species is closest to *T. caudata* New, from the Reserve Ducke, Amazonas, Brazil; the FW pigmentation patterns are identical in both species and the hypandria, paraprocts and epiproct are quite similar; the central tongue is convex in *T. caudata*; the most contrasting differences reside in the phallosome structure, quite distinct in both species (compare Fig. 20 of this paper with Fig. 10 in New 1980).

Triplocania cervantesi, spec. nov.

Figs 21-29

Types. Holotype: ♂, Belize, Cayo District, Chiquibul Forest Reserve, 3-6.IV.1995, Malaise trap 14, A. Howe & T. King (NHM). – Paratypes: ♀ allotype, 1♀, Las Cuevas, 23-26.I.1995, Malaise trap 11, T. King (NHM); further paratypes, all from Chiquibul Forest Reserve, Malaise traps: 1♀, 4-7.III.1996, A. Howe & Rosado (NIC); 1♂, 2♀♀,

1-4.IV.1996, A. Howe T. King (NIC); 1♀, 18-21.IV.1996, A. Howe & T. King (NIC);1♂, 29.IV.-2.V.1996, A. Howe & Rosado (NIC); 1♀, 16-17.V.1996, A. Howe & Rosado (NIC); 1♀, 27-30.VI.1996, A. Home & T. King (NIC); 1♂, 10-13.VI.1996, A. Howe T. King & Rosado (NIC).

Description

Female. Colour. Ground colour creamy white, with ochre areas in front coxae, thoracic pleurae, and irregular spotting on abdomen. Head pattern (Fig. 21): Antennae brown, flagellomeres white. Maxillary palps white, Mx4 light brown distally. Compound eyes black, ocelli hyaline, close together, each with ochre centripetal crescent. Legs pale brown, mid coxae medium brown, hind coxae creamy white. Fore wings hyaline, pterostigma with a light brown band proximally and distally; a light brown macula in confluence of Cu_2-1A, and a light brown band, along wing margin, from areola postica to R_{4+5}.

Morphology. Lacinial apex with small inner tyne and large, multidenticulate outer lobe (Fig. 24). Fore wing R and M branches distally sinuous. Areola postica very wide based, tall anteriorly and gently sloping posteriorly (Fig. 22). Subgenital plate (Fig. 25) broad, posteriorly rounded, with sides pigmented, setose as illustrated. Ovipositor valvulae (Fig. 27), with V_1 long, slender, about ⅘ the length of V_{2+3}. V_{2+3} with 3-4 large setae on outer lobe, distal process slightly curved posteriorly, bearing microtriches. 9th sternum with broad, almost rectangular, transverse area well defined, with median posterior process (Fig. 27). Paraprocts (Fig. 28), triangular, setose; sensory fields with 21-23 densely packed trichobothria, each issuing from a basal rosette. Epiproct (Fig. 28), wide based, with sides converging to a blunt apex, setae as illustrated.

Measurements. FW: 4610, HW: 3154, F: 1166, T: 1869, t_1: 831, t_2: 78, t_3: 141, ctt_1: 28, Mx4: 270, f_1: 763, f_2: 669, f_3: 551, IO: 430, D: 396, d: 268, IO/D: 1.08, PO: 0.67.

Male. Colour. Same as in female.

Morphology. Hypandrium (Fig. 23), a broad, setose, almost trapecial plate, posteriorly straight, with two slender, curved inward, distally acuminate posterior processes. Phallosome (Fig. 26) broadly V-shaped, with stout external parameres with distal field of pores, a central complex formed by two large, irregular sclerites, associated to two short, stout, posteriorly directed bodies, and, on each side, to a long, wide based, stout, distally acuminate sclerite, perpendicular to external parameres. Paraprocts (Fig. 29), almost elliptic, with field of short setae mesally on outer edge, other setae as illustrated, and sensory fields with 24-26 trichobothria issuing from basal rosettes. Epiproct (Fig. 29), trapecial, with field of short setae along posterior border, other setae as illustrated.

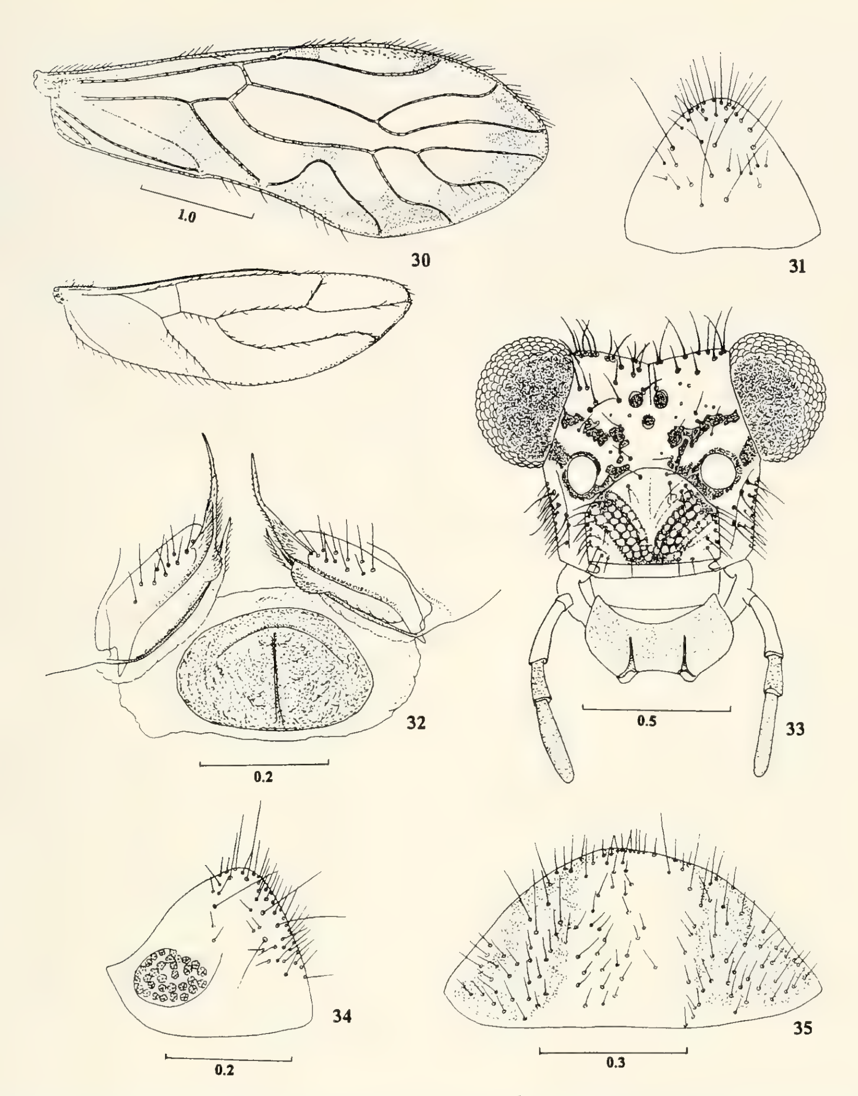
Measurements. FW: 3690, HW: 2493, F: 940, T: 1552, t_1: 704, t_2: 57, t_3: 131, ctt1: 27, Mx4: 243, f_1: 678, f_2: 583, f_3: 518, IO: 265, D: 421, d: 315, IO/D: 0.63, PO: 0.74.

Etymology. The specific name is the genitive after the last name of Dr. Luis Cervates Peredo, of the Natural History Museum, London, to whom the species is dedicated for the donation of specimens of Psocoptera collected in Belize.

Discussion. The subgenital plate, gonapophyses, 9th sternum, epiproct and paraprocts of both sexes, and the phallosome of *T. cervantesi* conform closely to the structural plan of the species in the genus. *T. cervantesi* shares with *T. caudata* New, 1980, *T. magnifica* Roesler, 1940, and *T. reflexa* Roesler, 1940, the peculiar shape of the fore wing areola postica and the fore wing marginal pigmented band; other than the shape of the areola postica, the fore wing is also very similar to that of *T. caudatoides*, spec. nov. *T. cervantesi* presents an hypandrium with posterior apophyses, lacking flanking sclerites or pigmented areas, that makes the species unique in the genus, and separable from the known species in it on the basis of these autapomorphies which could eventually segregate it as a genus distinct from *Triplocania*.

Triplocania chiquibulensis, spec. nov. (♀)
Figs 30-35

Types. Holotype: ♀, Belize, Cayo District, Chiquibul Forest Reserve, Las Cuevas, 16-19.XI.1994, Malaise Trap 15, T. King (NHM). – Paratypes (all same locality): 1♀, 13-16.IX.1994, Malaise Trap 15, E. Valdés (NHM); 1♀, 4-7.IX.1995, Malaise Trap 11, T. King & A. Howe (NIC); 1♀, San Pastor, 17-20.IV.1995, Flight Interception Trap 14, T. King & A. Howe (NIC); 1♀, 12-15.I.1996, Malaise Trap 11, T. King & A. Howe (NIC); 2♀♀, 18-21.IV.1996, Malaise Traps 11 & 14, A. Howe & T. King (NIC); 1♀, 29.IV.-2.V.1996, A. Howe & Rosado (NIC); 1♀, 27-30.V.1996, Malaise Trap 14, T. King & A. Howe (NIC).



Figs 30-35. *Triplocania chiquibulensis,* spec. nov. ♀. **30.** Fore and hind wings. **31.** Epiproct. **32.** Ovipositor valvulae and 9th sternum. **33.** Front view of head. **34.** Left paraproct. **35.** Subgenital plate. Fig. 31 to scale of Fig. 34.

Description

Colour. Creamy white, with ochre areas and spots in head (see pattern, Fig. 33), thorax and abdomen. Compound eyes black, ocelli hyaline, with large, ochre centripetal crescents. Mx3 and Mx4 brown, labrum brown; antennae flagellomeres: f_1 pale brown, with an ochre distal band, next to white apex, f_2 and subsequent ones with both ends white, followed by ochre bands, and brown in the middle. Lacinial apices ochre. Legs pale brown, femora with an oblique brown band anteriorly, and a brown oblique band posteriorly, front coxae with an ochre spot on inner face. Tergal lobes of meso- and metathorax ochre, pleurae of same segments with irregular brown spots forming a band, continuing through prothorax and cervix to head. Abdomen with irregular, ochre subcuticular rings, more conspicuous ventrally. Fore wings with irregular brown band along margin, pterostigma with a brown band anteriorly and posteriorly; a brown spot between areola postica and M (pattern, Fig. 30). Hind wing hyaline (Fig. 30).

Morphology. Fore wing pterostigma long and slender (Fig. 30). R_{2+3}, M_2 and M_3 sinuous; areola postica very wide based, slanted posteriorly. Subgenital plate broad, rounded posteriorly, with setae as illustrated and deeply pigmented along sides and posterior border, as illustrated (Fig. 35). Ovipositor valvulae (Fig. 32): V_1 long, slender, V_{2+3} heeled at base, with a field of ten setae on outer lobe; distal process, slightly curved, distally spiculate, with a distinct bulge on inner margin. 9th sternum (Fig. 32) broad, with a distinct, mesal, almost elliptic area, as illustrated. Paraprocts (Fig. 34) almost triangular, with setae as illustrated and almost circular sensory fields, with 32-33 trichobothria. Epiproct (Fig. 31) almost triangular, with setae as illustrated.

Measurements. FW: 4670, HW: 3211, F: 1177, T: 1995, t_1: 856, t_2: 101, t_3: 150, ctt_1: 29, Mx4: 248, f_1: 880, f_2: 785, f_3: 711, IO: 548, D: 437, d: 299.

Etymology. The specific name of this species is an adjective derived from the name of its area of distribution: Chiquibul Forest Reserve.

Discussion. The pigmentation pattern of the head, presented by *T. chiquibulensis* is unique in the genus, as unique is the inner bulge on V_{2+3}. *T. lunulata* New, 1980, also presents marginal lunules on cells R_{2+3} to areola postica, but the pattern and genital details easily separate both species.

Triplocania colombiana, spec. nov. (♀)

Figs 36-39

Types. Holotype: ♀, Colombia, Curicha, 11.IV.1967, B 1034 Malaise Trap, ex. P. Freytag (Leg. C. W. O'Brien) (NIC).

Description

Colour. Ground colour reddish brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Maxillary palps, antennae and legs brown. Fore wing (Fig. 36) with anterior third pale brown, a pale brown spot between areola postica and M, apices of veins with a wide brown spot, an irregular brown band along wing margin, from R_{2+3} to Cu_{1a}, leaving wide lunules on each cell, and pterostigma with brown bands anteriorly and posteriorly. Hind wing (Fig. 36), with anterior half pale brown.

Morphology. Fore wing pterostigma long, narrow anteriorly, wider in the middle, areola postica wide, slanted posteriorly (Fig. 36). Subgenital plate (Fig. 37) with sides converging to blunt apex, setae as illustrated, with wide pigmented band along sides and posterior border; an irregular, almost elliptic area underlying the plate posteriorly. Ovipositor valvulae (Fig. 38): V_1 long, slender, V_{2+3} wide based, heeled, with three large setae on outer lobe as illustrated, distal process stout, distally spiculate. 9th sternum (Fig. 38) broad, with distinct pigmented area as illustrated. Paraprocts (Fig. 39) broadly triangular, with setal field towards outer and posterior margins and two stout apical macrosetae; sensory fields with 23-25 trichobothria on basal rosettes. Epiproct (Fig. 39) long, triangular, with setae along sides and posterior margin, and three large mesal setae.

Measurements. FW: 3545, HW: 2474, F: 951, T: 1568, t_1: 613, t_2: 78, t_3: 132, ctt_1: 25, Mx4: 231, f_1: 638, f_2: 574, f_3: 511, f_4: 433, IO: 424, D: 364, d: 255, IO/D: 1.16.

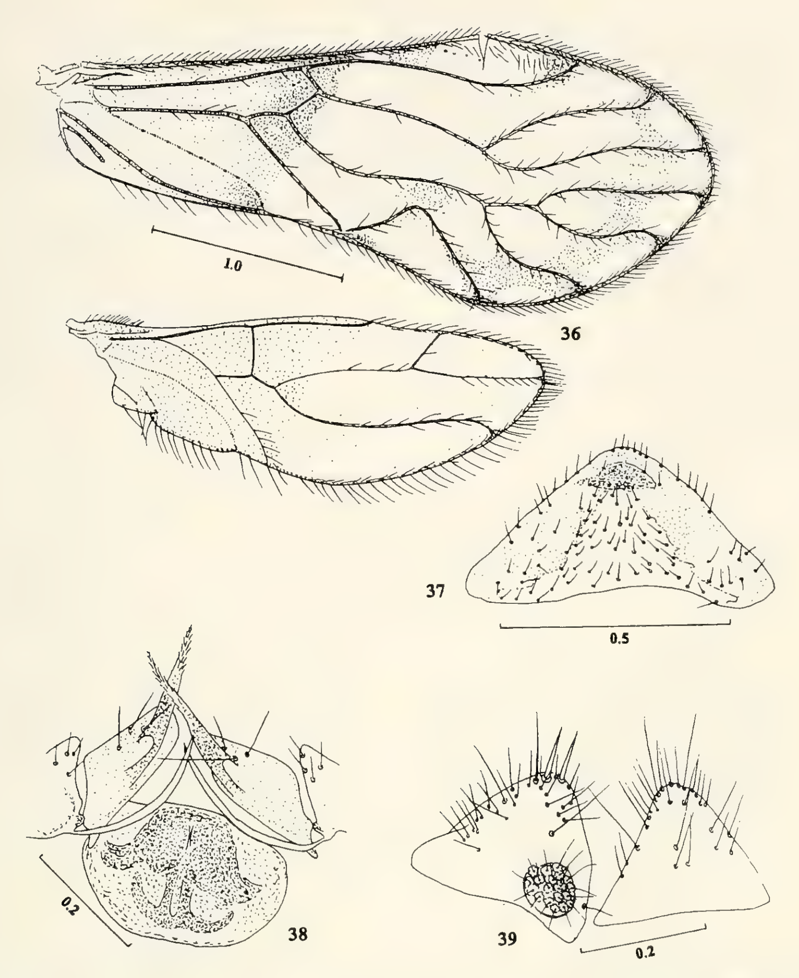
Etymology. The specific name makes reference to the country of origin of this species.

Discussion. The FW pattern of pigmentation and shape of the areola postica are reminiscent of *T. chiquibulensis*, spec. nov., although the latter lacks the pigmented basal third of the FW, a character shown by *T. lunulata* New, 1980. The stout posterior paraproctal setae represent a character almost unique in the genus, shared only with *T. obscura*, spec. nov. The 9th sternum is also distinct from the other known species of *Triplocania*.

Triplocania obscura, spec. nov. (♀)

Figs 40-44

Types. Holotype: ♀, Belize, Cayo District, Chiquibul Forest Reserve, 16-19.II.1995, Malaise trap 14, T. King & A. Howe (NHM).

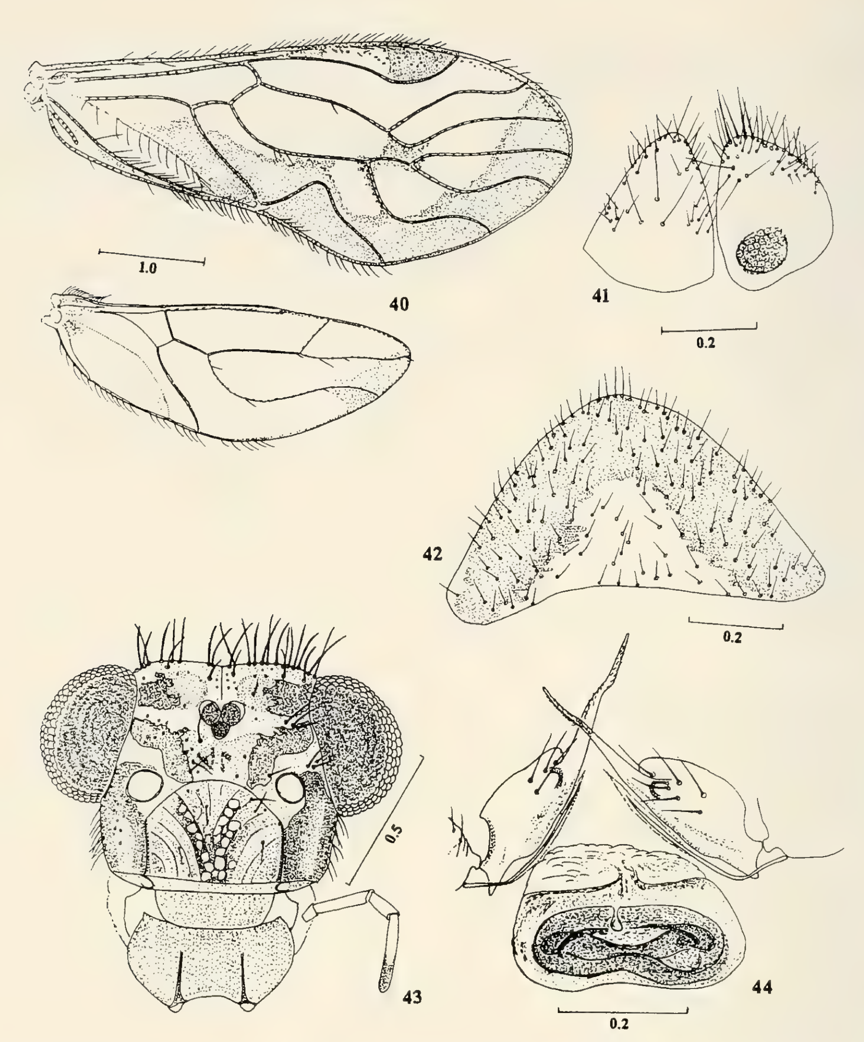


Figs 36-39. *Triplocania colombiana*, spec. nov. ♀. **36.** Fore and hind wings. **37.** Subgenital plate. **38.** Ovipositor valvulae and 9th sternum. **39.** Right paraproct and epiproct. Fig. 39 to scale of fig. 37.

Description

Colour. Creamy white. Compound eyes black, ocelli hyaline, with ochre centripetal crescents; head pattern (Fig. 43). Labrum and anteclypeus brown, apex of Mx4 brown, antennae pale brown, flagellomeres with brown bands near white proximal and distal apices. Tergal lobes of meso- and metathorax reddish brown; episternum of mesothorax ochre. Coxae, trochanters and femora creamy white, tibiae and t_1 pale brown, t_2 and t_3 reddish brown. Fore wing pattern (Fig. 40), pterostigma basally and distally brown; a wide, brown band along wing margin, from cell R_{2+3} to Cu_2, a brown area between base of R_{4+5} and M. HW mostly hyaline, with area limited by Cu_2 brown, and apex brown (Fig. 40).

Morphology. Fore wing pterostigma long, basally narrow, wide posteriorlyl (Fig. 40). R_{2+3}-M_3 sinuous. Areola postica very wide basally, slanted posteriorly, apex round, narrow (Fig. 40). Subgenital plate (Fig. 42) broad, setose, rounded posteriorly; pigmented area wide, along sides and posterior margin. Ovipositor valvulae (Fig. 44): V_1 long, slender; V_{2+3} stout, extended anteriorly and wider in the middle with 4-6 setae, distributed on outer lobe, as illustrated, distal process long, slender, almost straight, spiculated. 9th sternum (Fig. 44) wide, narrow, with a mesal coil as illustrated. Paraprocts (Fig. 41) triangular, with setae as illustrated and sensory fields with 39-41 trichobothria on small basal rosettes. Epiproct (Fig. 41) long, triangular, with setae along sides and posterior margin, and three large mesal setae.



Figs 40-44. *Triplocania obscura*, spec. nov. ♀. **40.** Fore and hind wings. **41.** Epiproct and left paraproct. **42.** Subgenital plate. **44.** Ovipositor valvulae and 9th sternum. Fig. 42 to scale of fig. 41.

Measurements. FW: 5205, HW: 3509, F: 1256, T: 2109, t_1: 850, t_2: 100, t_3: 135, ctt_1: 27, Mx4: 291, f_1: 775, f_2: 673, f_3: 636, IO: 571, D: 447, d: 299, IO/D: 1.27.

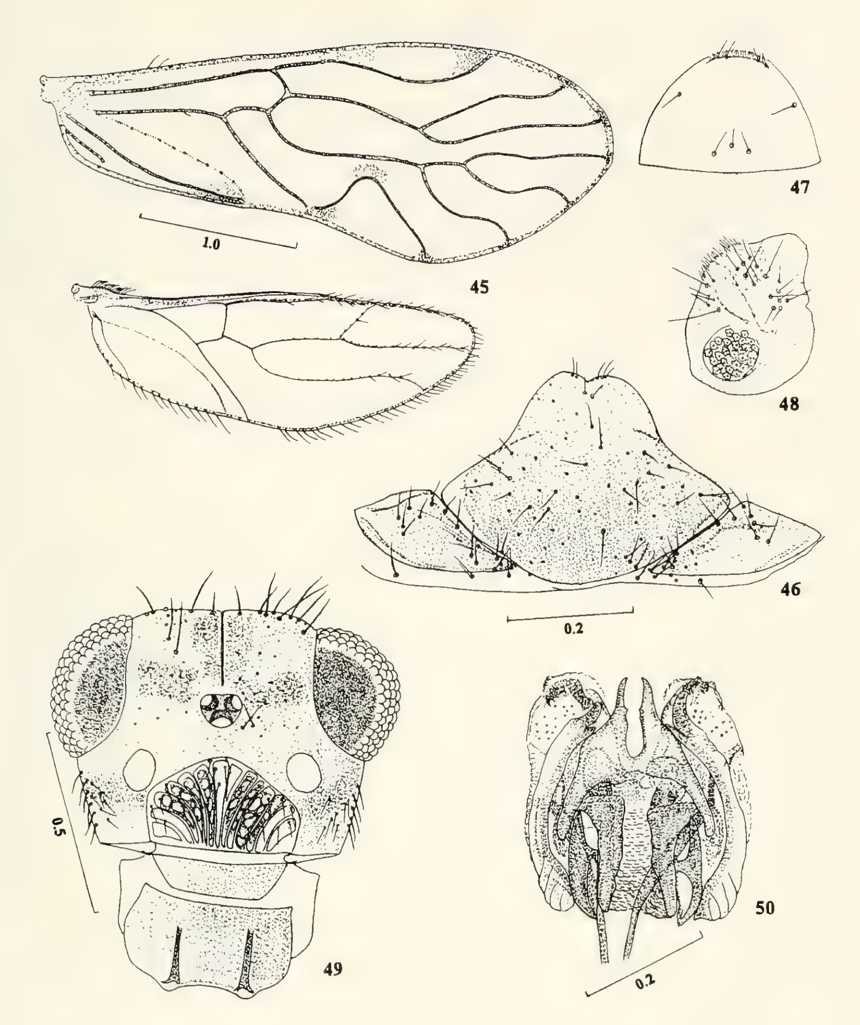
Etymology. The specific name "*obscura*" means dark, and refers to the pigmentation pattern of the head and fore and hind wings.

Discussion. This species shares with *T. colombiana*, spec. nov. having stout, apical paraproctal macrosetae. The FW and head patterns of pigmentation, and the 9th sternum are unique in the genus.

Triplocania robusta, spec. nov. (♂)

Figs 45-50

Types. Holotype: ♂, Peru, Madre de Dios, Río Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 290 m, 12°50'S, 69°17'W. Smithsonian Institution Canopy Fogging Project. T. L. Erwin et al. 10.IX.1984, 02/02/61 (SIC).



Figs 45-50. *Triplocania robusta*, spec. nov. ♂. **45.** Fore and hind wings. **46.** Hypandrium. **47.** Epiproct. **48.** Left paraproct. **49.** Front view of head. **50.** Phallosome. Figs 47 and 48 to scale of Fig. 46.

Description

Colour. Pale brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents. Head pattern (Fig. 49). Tergal lobes of meso- and metathorax dark brown. FW mostly hyaline, veins brown; pterostigma with brown bands proximally and distally, brown spots on apices of veins R_{2+3} to Cu_{1b}, a brown area on confluence of Cu_2-1A, and a brown spot above apex of areola postica. HW hyaline.

Morphology. Pterostigma wider in the middle (Fig. 45), M stem slightly concave proximally, then almost straight, M_2-M_3 sinuous, areola postica tall, slightly slanted posteriorly (Fig. 45). Hypandrium a broad central piece, anteriorly concave, projected posteriorly and distally bilobed, flanked by large, triangular sclerites; setae as illustrated (Fig. 46). Phallosome (Fig. 50) with large, distally rounded, pore bearing external parameres, a central, posterior sclerite, deeply divided, with each arm distally acuminate, flanked by elongate bodies, and proximally with two pairs of sclerites: outer ones acuminate, and inner ones club-shaped, posteriorly denticulate. Paraprocts (Fig. 48) broad, with a field of short setae on inner margin, other large setae as illustrated; sensory fields with 34-36 trichobothria on basal rosettes. Epiproct (Fig. 47) almost semicircular, with an anterior field of three setae, one mesal seta on each side, and four setae towards posterior margin next a transverse field of short setae.

Measurements. FW: 3573, HW: 2506, IO: 413, D: 365, d: 245, IO/D: 1.13.

Etymology. The specific name "*robusta*" means stout and refers to the broad central piece of the hypandrium.

Discussion. This species belongs in a group in which the males have the hypandrium formed by a large, central sclerite, flanked by smaller ones, one on each antero-lateral side. This group includes *T. bifida,* spec. nov., *T. brailovskyana,* spec. nov., *T. caudata* New, *T. caudatoides,* spec. nov., *T. immaculata* New, *T. lucida* Roesler, *T. rondoniensis,* spec. nov., *T. spinosa* Mockford, *T. tambopatensis* spec. nov., *T. umbrata* New, and *T. vazquezae* García Aldrete. It differs from all of them in the FW and head pigmentation patterns, and in the structure of the hypandrium and the phallosome. The information on hand does not allow to even guess at the relationships of this species to the others in the group.

Triplocania rondoniensis, spec. nov. (♂)
Figs 51-56

Types. Holotype: ♂, Brazil, Rondonia, 62 km SW Ariquemes, Fzda. Rancho Grande, 12.X.1992, C. W.& L. B. O'Brien (NIC). – Paratype: 1♂, same locality, 9.X.1993 (NIC).

Description

Colour. Ground colour brown. Compound eyes black ocelli hyaline, with ochre centripetal crescents. Head pattern (Fig. 53). Maxillary palps and antennae brown. Coxae, trochanters and femora creamy white. Femora with a brown spot distally; tibiae and tarsi brown. FW mostly hyaline, veins brown (Fig. 51). Pterostigma with brown bands anteriorly and posteriorly; apices of veins with dark brown spots. A pale brown band along wing margin from R_{2+3} to Cu_{1b}. A pale brown spot between areola postica and M_1 and a brown, tringular area between wing margin and Cu_2. HW hyaline (Fig. 51).

Morphology. Fore wing pterostigma long, narrow anteriorly, wider in the middle, with R, almost at right angle with wing margin, R_{4+5} - M_3 sinuous, areola postica tall, rounded apically, wide based (Fig. 51). Hypandrium a central sickle-shaped piece, with a stout, posterior projection, apically rounded, flanked by large, irregular sclerites; setae as illustrated (Fig. 56). Phallosome (Fig. 52) with basally slender, distally stout external parameres, each with two short pointed apophyses distally on inner edge and symmetrical phallosome sclerites, a large central one, flanked by elongate, distally rounded bodies. Paraprocts (Fig. 55), broad, rounded, with a field of dense, short setae an outer edge, other setae as illustrated; sensory field elongate, with 24-26 trichobothria on basal rosettes. Epiproct (Fig.54) wide basally, with sides converging to round apex, short field of small setae apically and five setae mesally, as illustrated.

Measurements. FW: 3513, HW: 2482, F: 924, T: 1502, t_1: 654, t_2: 65, t_3: 126, ctt_1: 22, Mx4: 272, f_1: 565, IO: 390, D: 349, d: 225, IO/D: 1.11.

Etymology. The specific name is an adjective derived from Rondonia, and refers to the area of distribution.

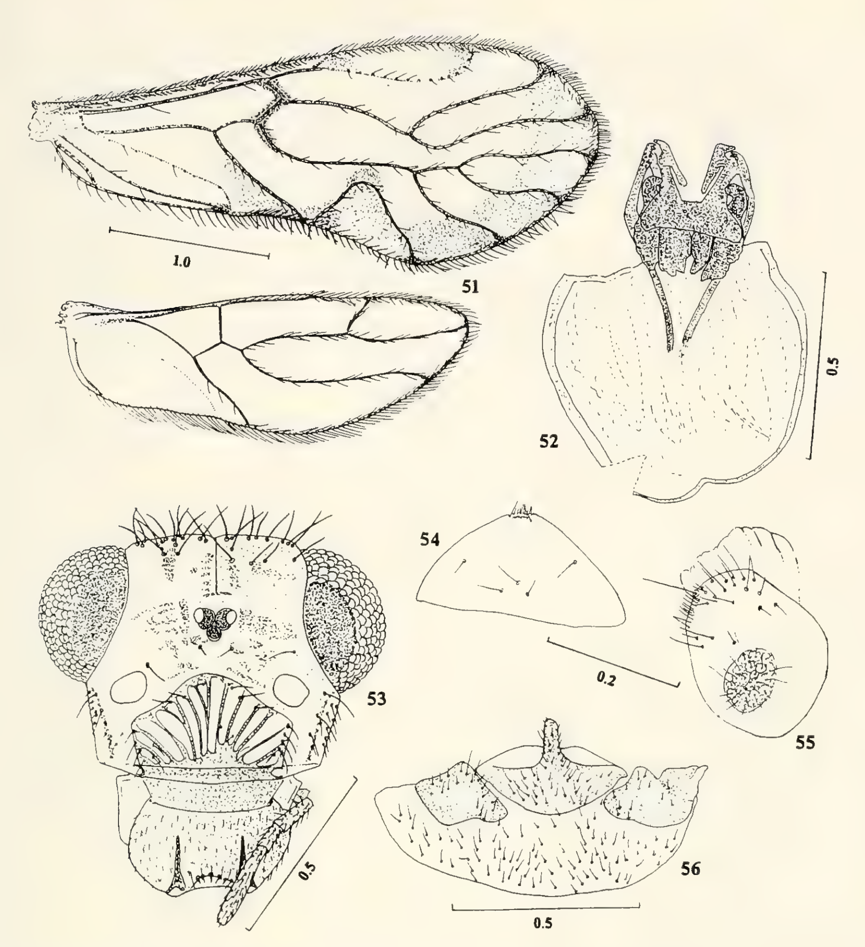
Discussion. The fore wing pigmentation pattern of this species is similar to that of *T. chiquibulensis,* spec. nov., except that it lacks the clear marginal lunules along the pigmented band. The head pigmentation patterns are also distinct in both species. It seems to stand close to *T. bifida,* spec. nov., *T. caudata* New, and *T. caudatoides,* spec. nov., on having the central sclerite of the hypandrium projected posteriorly.

Triplocania tambopatensis, spec. nov. (♂)
Figs 57-62

Types. Holotype: ♂, Peru, Madre de Dios, Río Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 290 m, 12°50'S, 69°17'W. Smithsonian Institution Canopy Fogging Project. T. L. Erwin et al. 4.V.1984, 01/02/57 (SIC).

Description

Colour. Reddish brown. Compound eyes black, ocelli hyaline, with ochre centripetal crescents, genae reddish brown, labrum brown, as well as maxillary palps, antennae, and legs. FW pattern (Fig. 57), veins brown, pterostigma with brown, transverse bands proximally and distally; a wide, brown band



Figs 51-56. *Triplocania rondoniensis*, spec. nov. ♂. **51.** Fore and hind wings. **52.** Phallosome. **53.** Front view of head. **54.** Epiproct. **55.** Left paraproct. **56.** Hypandrium. Fig. 54 to scale of Fig. 55.

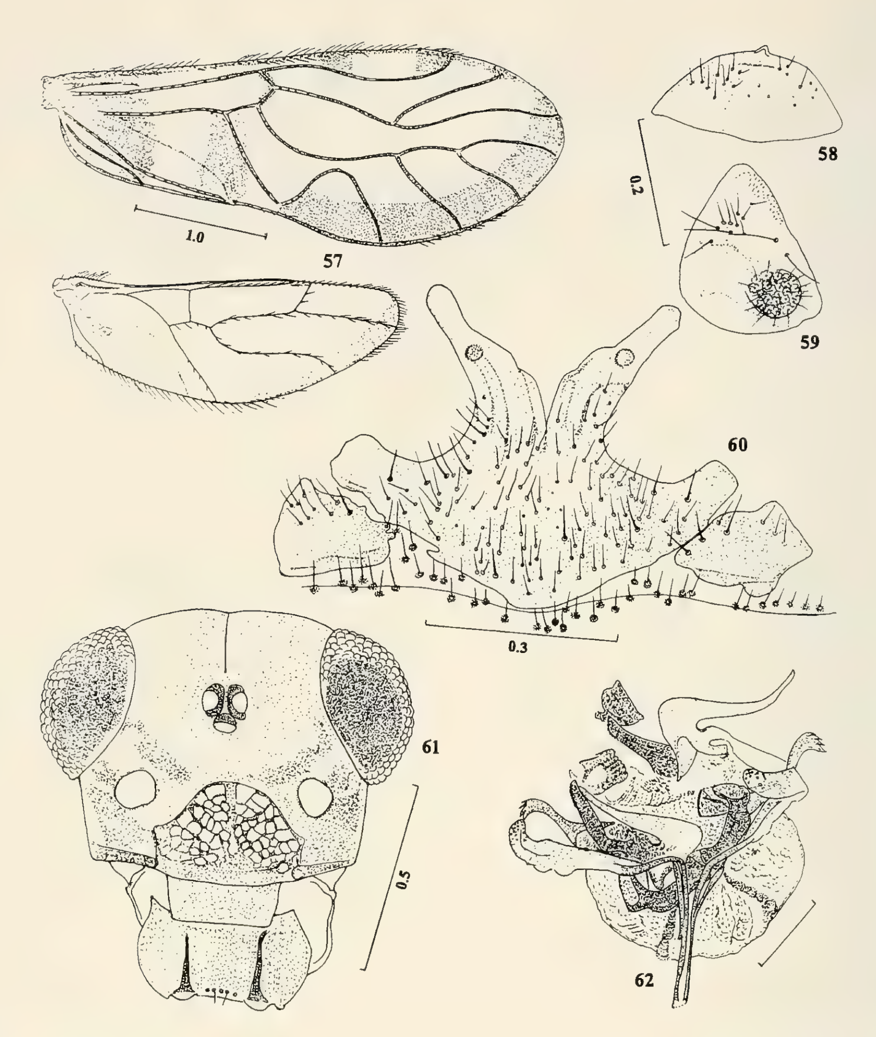
along wing margin, from cell R_{2+3} to Cu_{1b}, a transverse, pale brown band on basal half of wing, as illustrated, and a large brown area on proximal end of wing. HW mostly hyaline, with a small, pale brown area proximally, and a pale brown band along wing margin, as illustrated (Fig. 57).

Morphology. FW pterostigma elongate, constricted proximally (Fig. 57); M stem concave, areola postica tall, wide based. Hypandrium (Fig. 66), a large central piece flanked by irregular, setose sclerites. Central piece anteriorly rounded, convex, divided posteriorly in two stout, curved, distally blunt arms, each with a rounded protuberance on the inner surface, as illustrated. Phallosome (Fig. 62) with well developed, posteriorly rounded external parameres and four pairs of complex, symmetric sclerites. Paraprocts broad (Fig. 59), with a field of microsetae on inner edge, other setae as illustrated; sensory fields with 24-26 trichobothria on basal rosettes. Epiproct (Fig. 58) wide, with field of setae mesally and a small, posterior, median, conic protuberance.

Measurements. FW: 3891, HW: 2604, F: 914, T: 1585, t_1: 662, t_2: 59, t_3: 108, ctt_1: 22, Mx4: 202, f_1: 497, f_2: 357, f_3: 341, f_4: 506, f_5: 360, f_6: 332, IO: 440, D: 386, d: 242, IO/D: 1.13.

Etymology. The specific name is an adjective derived from Tambopata, and refers to the distribution of this species.

Discussion. The fore wing pigmentation pattern and venation of this species are reminiscent to those of *T. lunulata* New, although the latter lacks the transverse pigmented band and the former does not have well developed lunules along the marginal pigmented band. The rounded protuberances on the



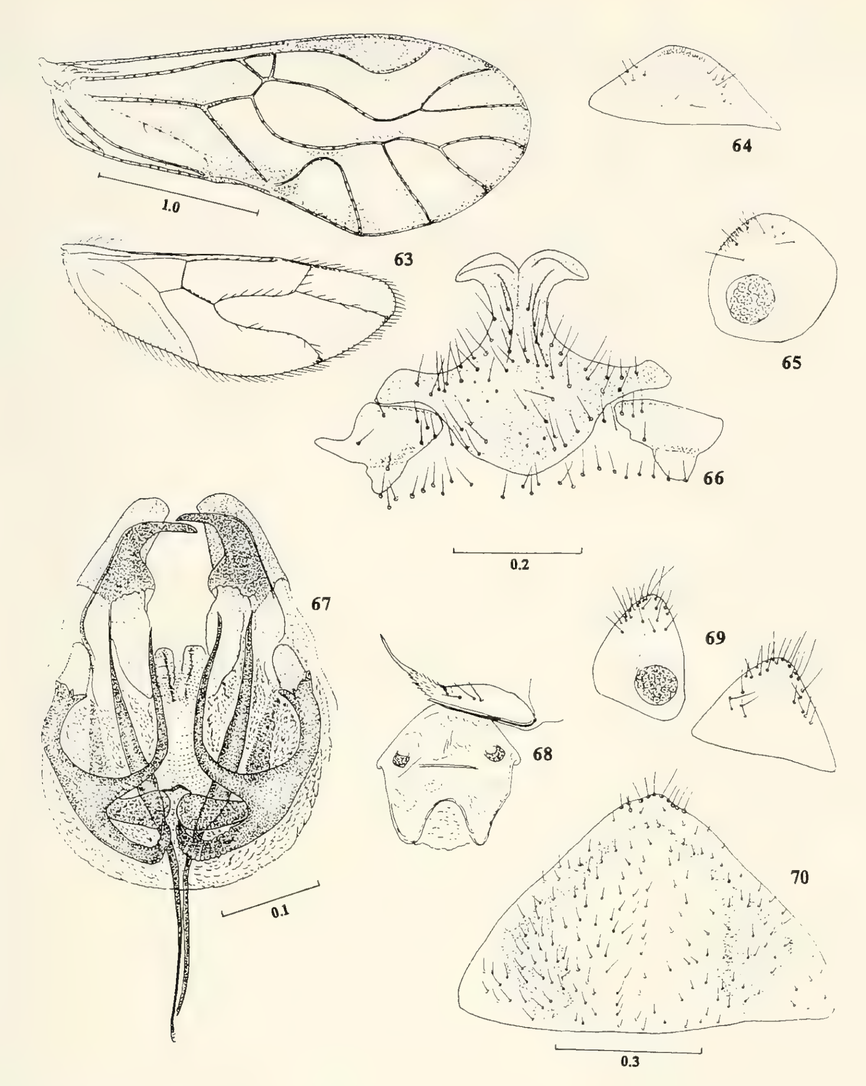
Figs 57-62. *Triplocania tambopatensis*, spec. nov. ♂. **57.** Fore and hind wings. **58.** Epiproct. **59.** Right paraproct. **60.** Hypandrium. **61.** Front view of head. **62.** Phallosome. Fig. 58 to scale of Fig. 59.

inner side of the hypandrium arms are unique, and the central sclerite of the hypandrium has the same general plan as in *T. lucida* Roesler and *T. reflexa* Roesler. This species is the only known *Triplocania* in which the male epiproct is projected posteriorly, rather than having a transverse marginal field of short setae.

Triplocania umbrata New
Figs 63-70

Triplocania umbrata New, 1980, p. 184. Holotype ♀, Reserva Ducke, Amazonas, Brazil (INPA).

This species was described from the Reserva Ducke, Amazonas, Brazil, in 1980, on the basis of two female specimens. One male and one female were collected in the Río Tambopata Reserve, Madre de Dios, Peru, by the Smithsonian Institution Canopy Fogging Project, in 1984. The male is herein described.



Figs 63-70. *Triplocania umbrata* New. **63.** Fore and hind wings, ♂. **64.** Epiproct, ♂. **65.** Left paraproct, ♂. **66.** Hypandrium, ♂. **67.** Phallosome, ♂. **68.** Ovipositor valvulae and 9th sternum, ♀. **69.** Right paraproct and epiproct, ♀. **70.** Subgenital plate, ♀. Figs 64 and 65 to scale of Fig. 66. Figs 68 and 69 to scale of Fig. 70.

Description of ♂

Colour. Essentially as described for the female.

Morphology. FW (Fig. 63) as described for the female; anomalous, having an additional crossvein from the proximal end of Rs to R_1. HW (Fig. 63). Hypandrium (Fig. 66), a large, anteriorly rounded sclerite, projected posteriorly, distally cleft in the middle, flanked by large, irregular slcerites; setae as illustrated. Phallosome (Fig. 67) with basal apodemes long, slender; external parameres stout, blunt ended; endophallic sclerites symmetric, complex (Fig. 67). Paraprocts (Fig. 65) large, rounded, with a long field of short setae on inner margin, other setae as illustrated. Epiproct (Fig. 64) wide based, with sides converging to round apex; with an elongate field of short setae along posterior margin, a field of setae on each side and three setae in the middle.

Measurements. FW: 3079, HW: 2142, F: 774, T: 1248, IO: 388, D: 311, d: 184, IO/D: 1.24.

Specimens examined: 1♂, allotype, Peru; Madre de Dios, Río Tambopata Reserve, 30 km (air) SW Puerto Maldonado, 290 m, 12°50'S, 69°20'W. Smithsonian Institution Canopy Fogging Project. T. L. Erwin et al. 14.IX.1984, 01/02/88 (– open parenthesis SIC); 1♀, same locality, 10.IX.1984, 02/02/65 (SIC).

Discussion. On the basis of the hypandrium and phallosome structure, this species is close to *T. lucida* Roesler, from which it differs in genital details and FW venation.

Acknowledgements

To Terry L. Erwin for facilitating the loan of specimens from Tambopata, Peru, taken by the Smithsonian Institution Canopy Fogging Project; to Christopher Lyal and Luis Cervantes Peredo of The Natural History Museum (London) for the donation of the Psocoptera from the Chiquibul Forest Reserve, Belize; to Charles W. O'Brien and Lois B. O'Brien of Florida A & M University (Tallahassee) for the donation of *Triplocania colombiana*. Thanks are also extended to H. Brailovsky and E. Barrera (Instituto de Biología, UNAM), for the specimens of *T. brailovskyana*, and to J. García Figueroa, F. Villegas and S. López of the same institution for logistic support during the preparation of this paper.

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SPIXIANA	22	2	167–172	München, 01. Juli 1999	ISSN 0341-8391

About *Rhyacophila hirticornis* McLachlan, 1879, and two closely related taxa

(Insecta, Trichoptera, Rhyacophilidae)

Lazare Botosaneanu

Botosaneanu, L. (1999): About *Rhyacophila hirticornis* McLachlan, 1879, and two closely related taxa (Insecta, Trichoptera, Rhyacophilidae). – Spixiana **22/2:** 167-172

Revision of a complex of three closely related taxa in the *philopotamoides*-group of *Rhyacophila*. *R. hirticornis* McLachlan, a rhithrobiont with wide distribution in the Alpine countries and the Mittelgebirge, is illustrated with more details than in previous publications. *R. hirticornis orobica* Moretti, a crenobiont probably with restricted distribution in the Prealps of Bergamo, is elevated to specific status. What was illustrated as *R. hirticornis* from a locality in the Velebit mountains (Dinarids, Croatia) is either an extreme form of the variable *R. hirticornis*, or a distinct taxon needing description.

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Introduction

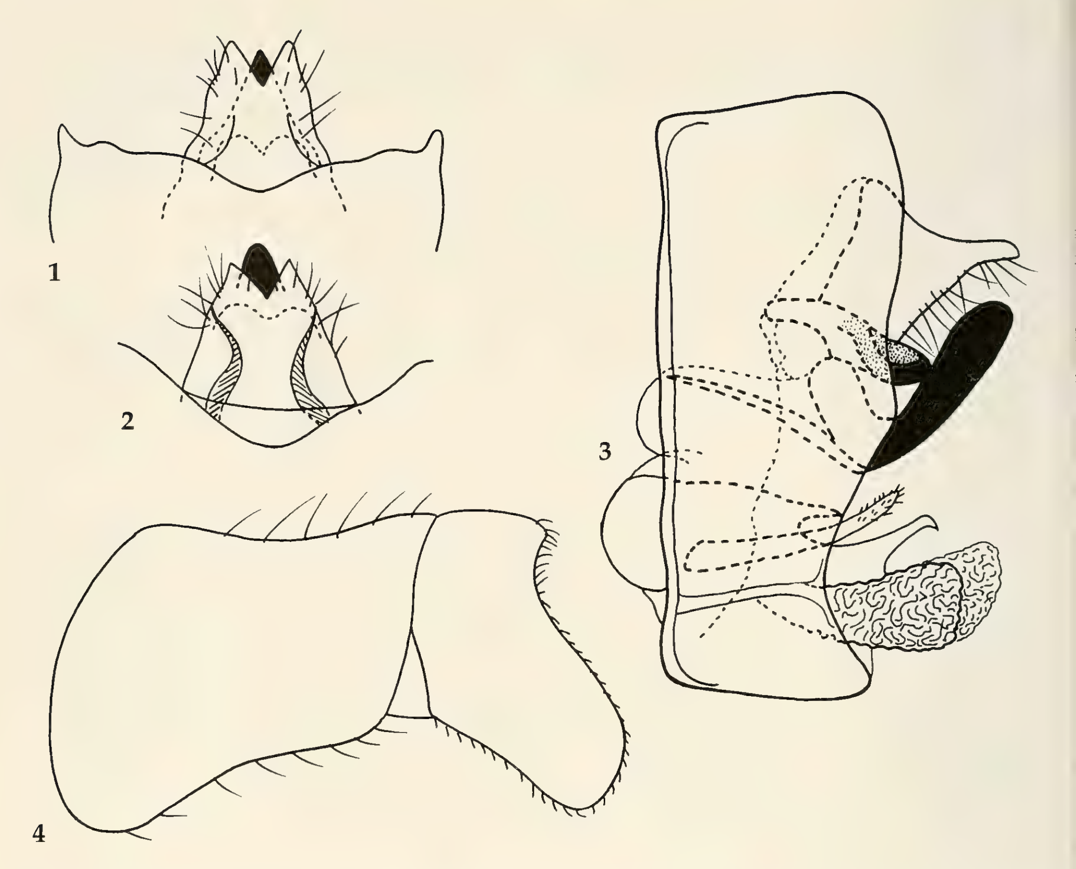
Rhyacophila hirticornis (male) was described by McLachlan in his Monographic Revision and Synopsis (p. 464 and Pl. XLIX, published 1879), the type specimen being from Zürich and belonging to H. Hagen's collection (it is probably this specimen which is mentioned – as cotype kept in the M.C.Z., Harvard University – in Weaver 1993). McLachlan's description, also based on examination of male specimens from "Austria", "Steyer", "Carinthia", "Carniola", and "Görz", is illustrated with a simple lateral view of the genitalia, correctly showing segment X and the gonopod but nothing else.

Subsequently (Fischer 1960, 1971) the species was repeatedly recorded from various countries in western and central Europe, but the only additional illustration was published in Eidel (1968) based on specimens from Baden-Württemberg: an equally incomplete lateral view, and also a dorsal view of segment X + tip of the "apical band".

Schmid (1970: 56, 124, Pl. XIX) illustrates, only with very brief comments, a male of the group of *philopotamoides* from "Brusanje, Alpes Dinariques, Yougoslavie" as being *hirticornis;* these very explicit drawings show that this is either an extreme form of the variable *R. hirticornis*, or a distinct taxon needing description. Schmid's drawings were subsequently considered as being *hirticornis*, and sometimes used for comparisons, by various authors (Tobias & Tobias 1981, Malicky 1983, Moretti 1991).

Moretti (1991) described *R. hirticornis orobica*, subspec. nov. (male) from a locality in the Alps of Bergamo/Lombardia. This well illustrated description (it should be noted that fig. 2 does not represent segment X, but the anal sclerites!), as well as examination of additional specimens, clearly show that *orobica* is an abundantly distinct species: it will be here elevated to species status.

Finally, the female of *R. hirticornis* was described in Novák (1963) based on specimens from Bohemia.



Figs 1-4. Genitalia, male of *Rhyacophila hirticornis* McLachlan from Zürich (June 1888; McLachlan det.: NHM, London). **1.** Segment X in „perfectly dorsal" view. **2.** Idem, slightly tilted anteriad. **3.** Lateral view. **4.** Inferior appendage, lateral.

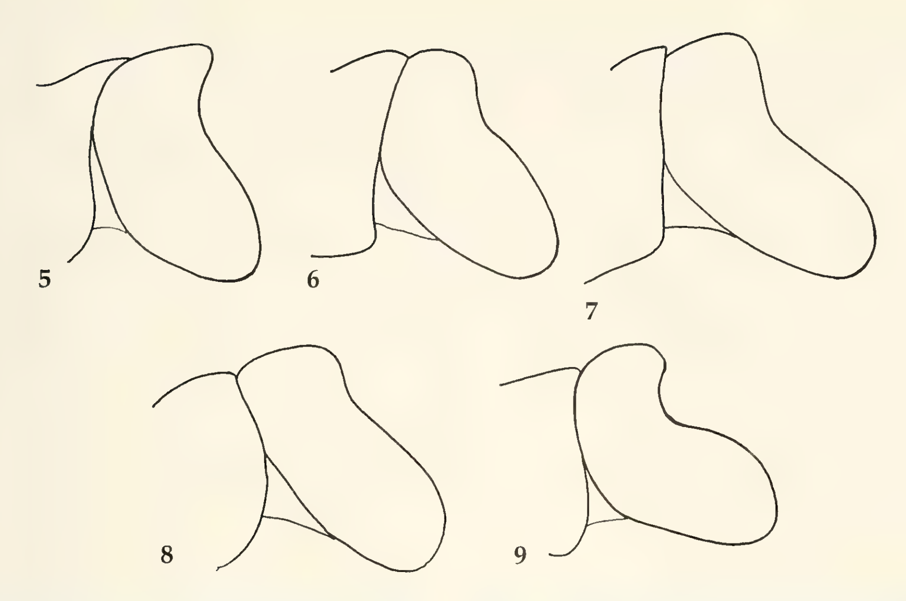
In the present paper the terminology for male genitalia in Schmid (1970) will be used. The following warnings are necessary: for comparisons, segment X should be examined in a "perfectly dorsal" position (i. e. the position obtained when, in lateral view, segment X is horizontally – not obliquely – placed), even a slight tilting rather strongly modifiying the aspect; and it should be taken into account that the structures below segment X, and especially the "apical band", are subject to strong seesaw which can cause radical modification in the view from behind.

Rhyacophila hirticornis McLachlan, 1879
Figs 1-9

Material examined. Male specimens from Switzerland ("Zürich" – the type locality for the species –, and "Lucerne"); Italy (Venzone-Udine), and "Trbiž" – presently Tarvisio, in Friuli – Venezia; Austria (Lunz am See); Slovenia ("Ljubljana"). Moreover, Dr. P. Chvojka has examined, at my request, specimens from Klapálek's collection at the National Museum of Prague (from Bohemia and the Alps of Austria, Switzerland, Slovenia, and Italy), as well as specimens from Bohemia (Sumava Mts.) made available by Dr. K. Novák.

Concerning the type of this species: see Introduction.

Description of most distinctive parts of male genitalia. Segment X in "perfectly dorsal" view conical, with slightly sinuous margins, apically deeply split in two pointed lobes, it is well elongate, not allowing observation – in dorsal view – of the subjacent structures (when segment X is strongly tilted



Figs 5-9. *Rhyacophila hirticornis* McLachlan, male, variability of the harpago. Specimens from Lucerne/ Switzerland **(5)**; Venzone-Udine/Italy **(6)**; "Trbiž" = Tarvisio, Friuli-Venezia **(7)**; Lunz am See/Austria **(8)**; Ljubljana/Slovenia **(9)**.

anteriad, the shape becomes more thick-set, the margins strongly sinuous, and the apical split shallower). Lateral arms of the apical band pale, not sclerotized. Harpago generally only with shallow or very shallow distal excision, upper lobe only slightly or very slightly protruding (there is variability in the shape of harpago, the deepest excision being observed in the specimen from Ljubljana). Dorsal appendage of phallic apparatus of variable shape, sometimes pointed (fig. 3) but sometimes bluntly ending.

Distribution, habitat. The incomplete available evidence shows that *R. hirticornis* is widely distributed in the Alpine countries, and also in (parts of) the eastern and western Mittelgebirge of central Europe. It is a rhithrobiont.

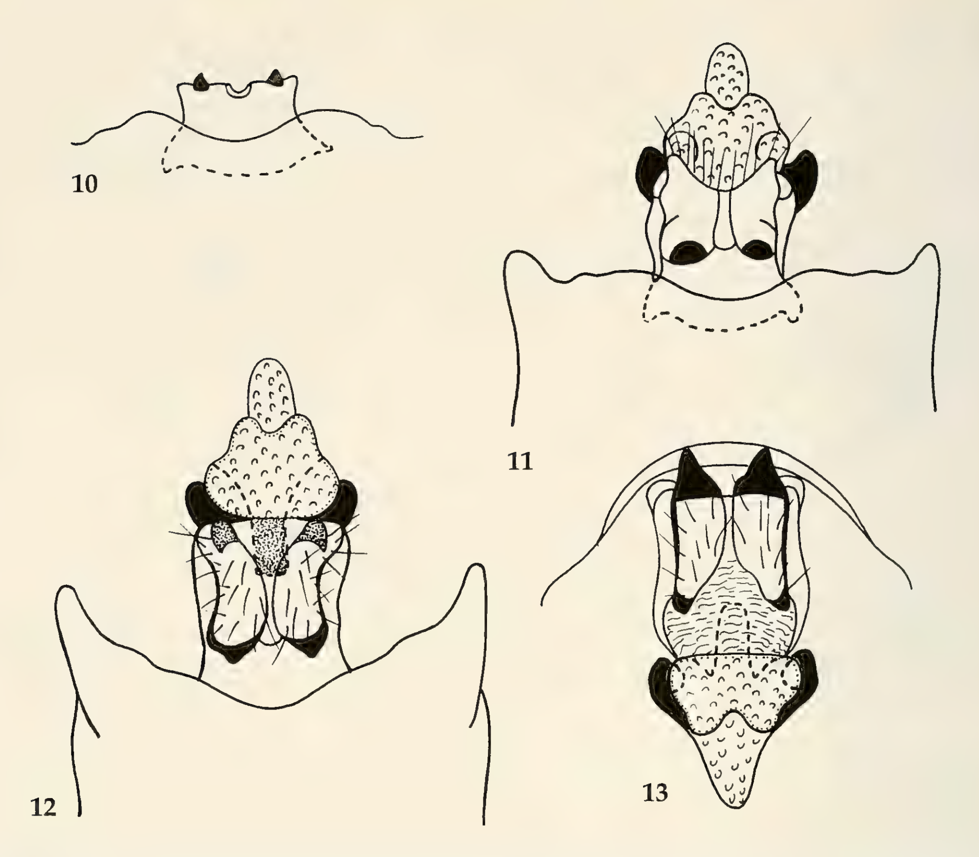
Rhyacophila orobica Moretti, 1991 (stat. nov.)

Figs 10-13

Material examined. Two male specimens from Lombardy: Monasterolo (BG) Val Torrezzo Fontanello; 13.V.1996, leg. Cornali Gozzini; collected at light; coll. Museum of Natural Sciences Bergamo; det. M. Valle "*R. hirticornis orobica* Mor.". The holotype is kept in the Moretti collection at the Institute of Zoology, University of Perugia.

Description of most distinctive parts of male genitalia. Segment X in „perfectly dorsal" view very short, allowing good observation of the subjacent structures: anal sclerites and distal part of the apical band; it has a characteristic shape (fig. 10) with a small medio-distal sinus (but with a deep and wide emargination when it is even slightly tilted anteriad: fig. 11) and slightly produced distal angles. Lateral arms of the apical band heavily sclerotized, blackened. Harpago (fig. 1 in Moretti 1991) with very deep distal excision, and narrow and long upper lobe.

Distribution, habitat. All existing evidence (Moretti 1991, Bertuetti, Moretti & Valle 1996) shows that *R. orobica* has a restricted distribution, being possibly an endemite of the Prealps of Bergamo ("Orobie"). It seems to be either a true crenobiont or, at least, a distinctly crenophilous species.



Figs 10-13. Genitalia, male of *Rhyacophila orobica* Moretti from Monasterolo, Bergamo/Italy; May 13, 1966; Mus. Nat. Sci., Bergamo). **10.** Segment X in „perfectly dorsal" view. **11-12.** Idem, slightly and more strongly tilted anteriad, with subjacent "anal sclerites", tip of "apical band" and its lateral arms (blackened). **13.** Segment X, "anal sclerites", and "apical band" with its lateral arms, from behind.

Rhyacophila spec.

Fig. 14

No material could be examined. The location of the male specimen illustrated by Schmid (1970: Pl. XIX) as *R. hirticornis*, is unknown; it could be in the "National Canadian Collection of Insects", Ottawa, but my attempts to obtain information from that institution remained unsuccessful; and, unfortunately, Fernand Schmid, the famous trichopterist, passed away on Nov. 22, 1998. The locality was published as "Brusanje, Alpes Dinariques, Yougoslavie"; its correct name is probably Brušane (in the Velebit mountains, between Karlobag and Gospic, N. from Zadar/Croatia).

The illustration published by Schmid (1970) shows that possibly a taxon slightly distinct from *hirticornis* is involved. But it is also possible that we have here only a rather extreme variant of that species.

Description of the most distinctive parts of male genitalia. Segment X in dorsal view (probably illustrated in the position obtained when the segment is like in the lateral figure) thick-set, short, with wide and rather deep distal sinus and distal angles obliquely cut and slightly bilobed. Harpago with rather deep distal sinus, upper lobe strongly protruding, narrow, with blunt apex.

Distribution. Possibly endemic in (parts of) the Dinarids.

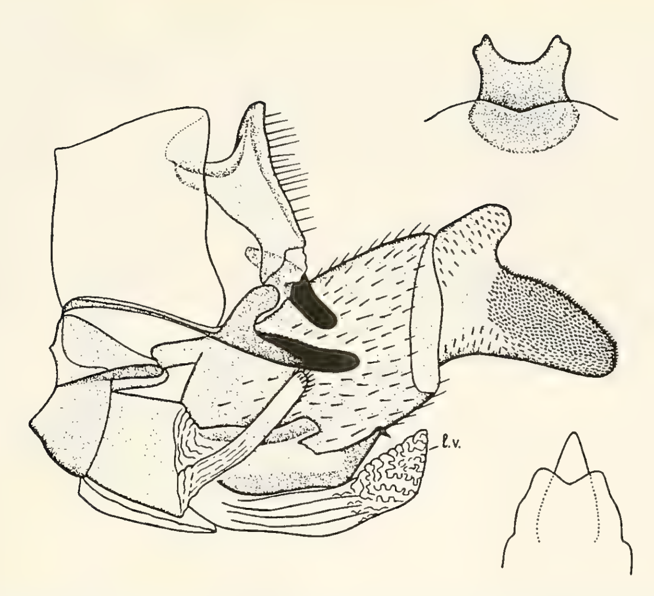


Fig. 14. Genitalia of *Rhyacophila* sp. from "Brusanje", Velebit/Dinaric Alps. Drawings from Schmid 1970. Lateral view; segment X, dorsal (right, above); and "anal sclerites" with "apical band" (right, below).

Final notes

Rhyacophila hirticornis, *R. orobica* and – if distinct – *R.* spec. from the Velebit mountains are closely related species of the *philopotamoides*-group. They share several characters of the male genitalia: segment X well rooted under tergite IX; presence of parameres; aedeagus with hooked tip, with well developed but membranous dorsal appendage; and strongly developed, fleshy, bilobed "ventral lobe" (lobes upturned). The most reliable differences can be found in the shape of segment X observed in a "perfectly dorsal" position (compare figs 1 and 10) and in that of the harpago in lateral view (compare figs 4 -9; fig. 1 in Moretti 1991; and fig. 14).

Acknowledgements

This study has been made possible by co-operation of several colleagues. Dr. M. Valle (Museo Civico di Scienze Naturali, Bergamo) has sent for study, and donated, specimens of *R. hirticornis* and *R. orobica*, this being an incentive for starting the present study. Dr. P. C. Barnard arranged a loan of several specimens of *R. hirticornis* from the MNH, London, identified by R. McLachlan, F. Klapálek, or M. E. Mosely. Dr. P. Chvojka (Museum of Natural History – Entomology, Prague) has examined, at my request, additional specimens, including some from the collection of Dr. K. Novák (Institute of Entomology, Česke Budějovice), and offered valuable comments.

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A New Species of the Bee Genus *Neocorynura* from the Andes of Ecuador

(Hymenoptera, Halictidae, Augochlorini)

Michael S. Engel

Engel, M. S. (1999): A New Species of the Bee Genus *Neocorynura* from the Andes of Ecuador (Hymenoptera, Halictidae, Augochlorini). – Spixiana **22/2:** 173-178

Neocorynura papallactensis, spec. nov. is described and figured from the Andes of Ecuador. The species was discovered at an elevation of 3200 meters in northern Ecuador. It is distinguished from the other two *Neocorynura* species presently recorded from Ecuador: *N. fuscipes* (Packard) and *N. nigroaenea* (Packard).

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Introduction

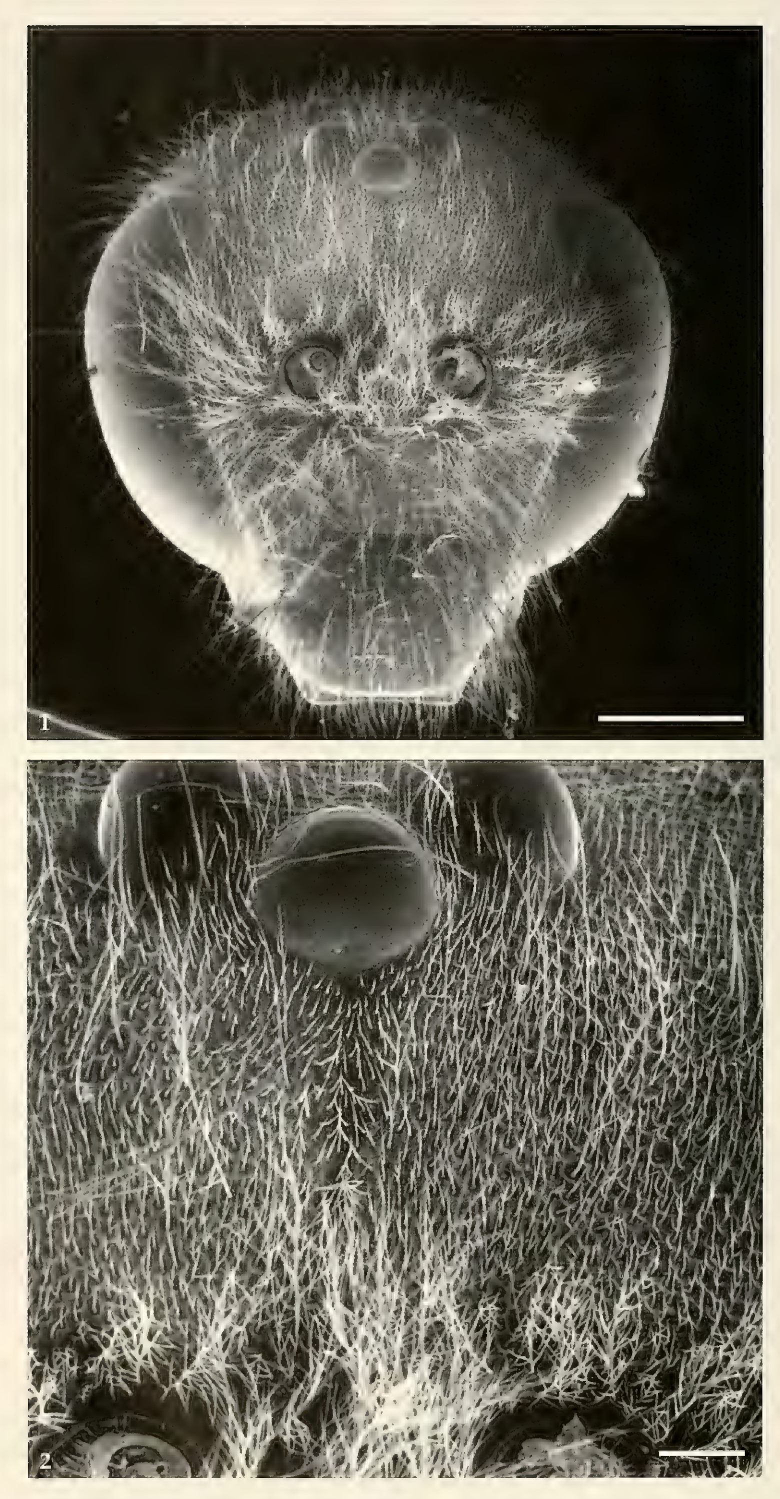
The bee genus *Neocorynura* Schrottky is one of thirty-nine genera and subgenera of the New World tribe Augochlorini (Engel 1998). The group is one of the more widely distributed genera in the tribe with species ranging from northern Argentina to Mexico. One species is presently known from the island of Trinidad but the genus is otherwise not found in the West Indies except for a single specimen found in Oligocene-Miocene Dominican amber (Engel 1995). The genus is difficult to place among the other genera of the tribe owing to an odd mix of plesiomorphic and apomorphic traits. A recent cladistic analysis of the tribe based on the classification of Engel (1998) failed to unambiguously group *Neocorynura* with any other clade of genera (Fig. 6). The future discovery of new character information will hopefully shed light onto the phylogenetic affinities of these bees.

Herein I present the description of a new species of *Neocorynura* found at high altitudes in the Andes of Ecuador. This species was listed as "*Neocorynura* new species 3" in Engel (1998). Two other *Neocorynura* species are presently recorded from Ecuador – *Neocorynura fuscipes* (Packard) and *N. nigroaenea* (Packard) – and are differentiated from the species presented here as new.

Material and Methods

The format for the descriptions follows that used for other augochlorine bee species (e.g. Engel 1997, Engel & Brooks 1998). The abbreviations F, S, and T are used for flagellomere, sternum, and tergum respectively. All measurements were made using an ocular micrometer on a WILD-M5a microscope. Values of total body length were arrived at by summing the individual lengths of the tagmata.

Scanning electron microscopy was carried out at the American Museum of Natural History. Preparation of specimens followed the hexamethyldisalizane procedure outlined by Brown (1993, also discussed in Engel 1998).



Figs 1-2. *Neocorynura papallactensis*, spec. nov., male head. **1.** Entire head. Scale bar = 500 μm. **2.** Detail of face above level of antennae. Scale bar = 100 μm.

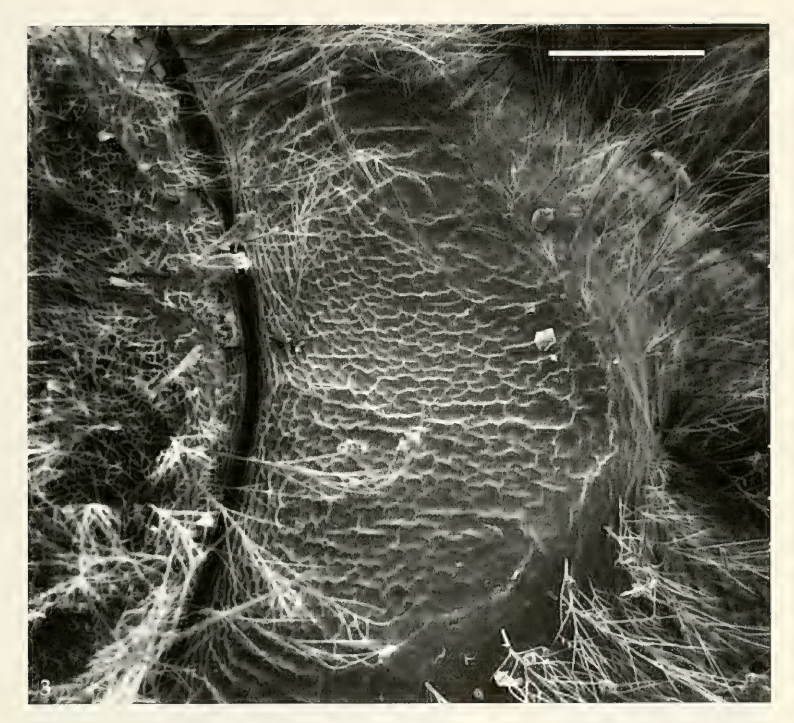


Fig. 3. *Neocorynura papallactensis*, spec. nov., basal area of male propodeum. Scale bar = 200 μm.

The following abbreviations are used for institutions holding material discussed herein: American Museum of Natural History, New York, New York, J. G. Rozen, Jr. (AMNH); the Natural History Museum, British Museum, London, C. Taylor and G. Else (BMNH); Cornell University Insect Collection, Ithaca, New York, J. K. Liebherr and E. R. Hoebeke (CUIC); Museum of Comparative Zoology, Harvard University, P. Perkins and S. Cover (MCZ); Snow Entomological Collection, Natural History Museum, University of Kansas, Lawrence, Kansas, R. W. Brooks and C. D. Michener (SEMC).

Neocorynura papallactensis, spec. nov.
Figs 1-5

Type material. Holotype: ♂, Ecuador, Napo-Pastaza Province, Papallacta, 10.500 feet elevation [approx. 3.200 meters], 29 January 1958, R. W. Hodges (CUIC). – Allotype: ♀, same data as holotype (CUIC). – Paratypes: 6♂♂, same data as holotype (CUIC); 1♂, same data as holotype (AMNH); 1♂, same data as holotype (BMNH); 1♂, same data as holotype (MCZ); 2♂♂, same data as holotype (SEMC).

Diagnosis. *Neocorynura papallactensis* can be distinguished from most *Neocorynura* species by the striate gena, dense pubescence of the head (Fig. 1), contiguously punctate face (Fig. 2), rugulose propodeum, and metasomal markings in the male. *Neocorynura fuscipes* and *N. nigroaenea*, both from Ecuador, are presently known only on the basis of females but these can be easily differentiated from *N. papallactensis*. In *N. papallactensis* the female face is contiguously punctured (cf. Fig. 2) and mostly black, the pleura are metallic copper-green, the wings are hyaline, the propodeum is metallic copper and rugulose, and the metasoma is entirely dark brown. In *N. nigroaenea* the female face is bluish-green with sparse punctures, the pleura are black, the wings are lightly fuscous, and the bases of the metasomal terga are metallic green. Lastly, in females of *N. fuscipes* the face is metallic green, the basal area of the propodeum is metallic green and granular, the wings are reddish-brown, the second metasomal tergum is metallic green along its base, and the remaining terga are lightly green on their lateral margins.



Figs 4-5. *Neocorynura papallactensis*, spec. nov., male genitalia. **4.** Ventral aspect. **5.** Dorsal aspect. Scale bar = 200 μm.

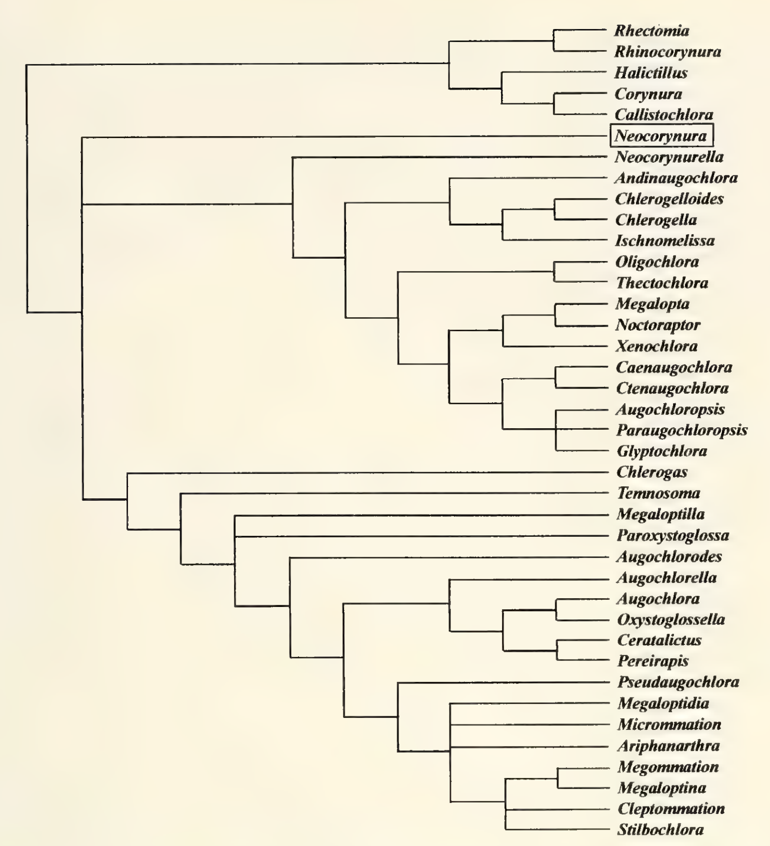


Fig. 6. Phylogeny of the bee tribe Augochlorini with the position of *Neocorynura* indicated (phylogeny from Engel 1998).

Description

♂: Total body length 9.78 mm; forewing length 8.16 mm. Head slightly wider than long (length 2.14 mm, width 2.20 mm). Upper interorbital distance 1.30 mm, lower interorbital distance 1.04 mm. Mandible simple. Anterior border of mesoscutum strongly narrowed and projecting over pronotum. Median line strongly impressed, impression broadens anteriorly to form a minute glabrous patch. Parapsidal lines moderately impressed. Intertegular distance 1.64 mm. Inner hind tibial spur serrate. Basal vein distad cu-a by three times vein width; 1r-m confluent with 1m-cu; 2r-m distad 2m-cu by six times vein width; 2r-m relatively straight. Second submarginal cell slightly narrowed anteriorly; anterior border of second and third submarginal cells approximately equal in length; length of posterior border of third submarginal cell nearly twice length of anterior border. Distal hamuli arranged 3-1-3 on anterior margin of hind wing. Basal area of propodeum approximately equal in length to scutellum; metanotum just less than one-half scutellar length. Metasoma petiolate. Male genitalia depicted in figs 4-5.

Clypeus with widely scattered faint punctures, integument between granular. Supraclypeal area granular. Face below antennae as on clypeus, above antennae contiguously punctured (Fig. 2), becoming roughened by vertex. Gena dorso-ventrally striate, striae becoming weak by postgena which is imbricate. Pronotum dorsally imbricate, laterally imbricate with minute punctures near bend running from propleuron to pronotal lateral ridge. Mesoscutum strongly granular and punctured around parapsidal lines. Scutellum as on mesoscutum. Metanotum minutely roughened. Preepisternum coarsely roughened and with coarse punctures along border with mesepisternum. Mesepisternum and metepisternum granular. Propodeal lateral and posterior surfaces granular; basal area rugulose (Fig. 3). Metasoma faintly imbricate.

Mandible black with reddish apex. Labrum black. Clypeus black at apex, remainder metallic copper-green. Supraclypeal area and face below level of antennae metallic copper-green, remainder of face, vertex, and upper half of gena black with a few widely scattered copper highlights. Scape, pedicel, and F1 black; F2-11 black on upper surface, brown on lower surface. Lower half of gena becoming metallic copper-green and copper on postgena. Pronotum dark brown with strong metallic copper-green highlights on dorsal surface, such highlights weaker but present on lateral surface. Mesoscutum black with a few faint green highlights laterally. Tegula dark brown. Wings hyaline; veins brown. Scutellum as on mesoscutum. Metanotum metallic copper-green. Pleura metallic copper-green. Propodeum metallic copper with a few faint green highlights. Legs dark brown with metallic green highlights except amber and without highlights on tarsi, apices of tibiae, and base of metatibia. T1 brown with metallic green highlights; T2 amber except apical margin brown; T3 dark brown except basal quarter amber; T4-7 dark brown; S1 amber except along basal margin and medially brown; S2 amber; S3-6 brown.

Pubescence generally golden except fuscous on face, upper half of gena, mesoscutum, tegula, and scutellum. Hairs of head and mesosoma particularly thick but not obscuring the integument (Fig. 1). Pubescence over head, mesoscutum, scutellum, metanotum, pleura, and propodeal lateral and posterior surfaces very long (3-4 times diameter of median ocellus) and plumose. Metatibia and metabasitarsus with field of short, stiff, yellow hairs on inner surface. Hairs of metasoma generally short (0.5-1.5 times diameter of median ocellus) and simple. Band of off-white tomentum along base of T2. Hairs of S5-6 medially directed with small patch on central disk lacking pubescence.

♀: As for the male except as indicated. Total body length 9.44 mm; forewing length 7.92 mm. Head wider than long (length 2.08 mm, width 2.24 mm). Upper interorbital distance 1.32 mm, lower interorbital distance 1.28 mm. Mandible with strong subapical tooth. Intertegular distance 1.72 mm. Inner hind tibial spur pectinate, with four long teeth (not including apex of spur as a tooth). Metasoma oval, not petiolate.

Legs dark brown except amber on inner surfaces of tibiae. Metasoma dark brown without amber markings.

Scape without long, plumose hairs. Short, fuscous hairs on outer surfaces of meso- and metatibiae and basitarsi. T2 without band of tomentum at base. Sterna with dense, long, mostly simple, gold hairs.

Derivatio nominis. The specific epithet is derived from the type locality; Papallacta, Ecuador.

Acknowledgements

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A new subgenus of the family Xenophoridae Philippi, 1853

(Mollusca, Gastropoda)

Kurt Kreipl , **Axel Alf** and **Gijs C. Kronenberg**

Kreipl, K, A. Alf & G. C. Kronenberg (1999): A new subgenus of the family Xenophoridae Philippi, 1853 (Mollusca, Gastropoda). – Spixiana **22/2:** 179-180

Austrophora, subgen. nov. is described, based on characters of the operculum and protoconch. Characters of the operculum are compared with those of the family Strombidae and other species of Xenophoridae.

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Introduction

The family Xenophoridae Philippi, 1853 presently consists of 26 recent species and subspecies. In his revision of this family, Ponder (1983) recognized three subgenera, viz. *Xenophora* Fischer von Waldheim, 1807, *Stellaria* Möller, 1832, and *Onustus* Swainson, 1840, based on conchological and minor anatomical differences. This opinion was followed by Kronenberg & Goud (1988) and other subsequent authors, like Wilson (1993: 167-169). In our opinion however, differences between these taxa are large enough to advocate genus status for these taxa.

Within *Xenophora*, one recent species, *Xenophora flindersi flindersi* Cotton & Godfrey, 1938 differs markedly from all other living species of this family by the shape of its protoconch and operculum. Therefore we decided to describe a new subgenus of *Xenophora* for that species.

Austrophora, subgen. nov.

Figs 1, 2

Type species. *Xenophora flindersi* Cotton & Godfrey, 1938, recent, Southern Australia.

Description

Subgenus of Xenophoridae with over 60 % of its dorsum covered by foreign attachments, protoconch paucispiral. Operculum elongated, nucleus mid-lateral, straight, edges almost parallel, each bearing about 5 serrations. External surface smooth with weak growth lines, inner surface with a heavy, narrow rib, extending from the outer edge to just over halfway through the attachment scar towards the inner edge. Serrated portion (about half the length of the operculum) projects freely beyond the opercular lobe (after Ponder 1983: 26) (Figs 1a, b).

Etymology. Derived from the Latin prefix *austro*, meaning Southern, and the noun *phorus* (feminin: *phora*), meaning carrier, combined *Austrophora*, the southern carrier, referring to the distribution of the new subgenus. Gender feminin.

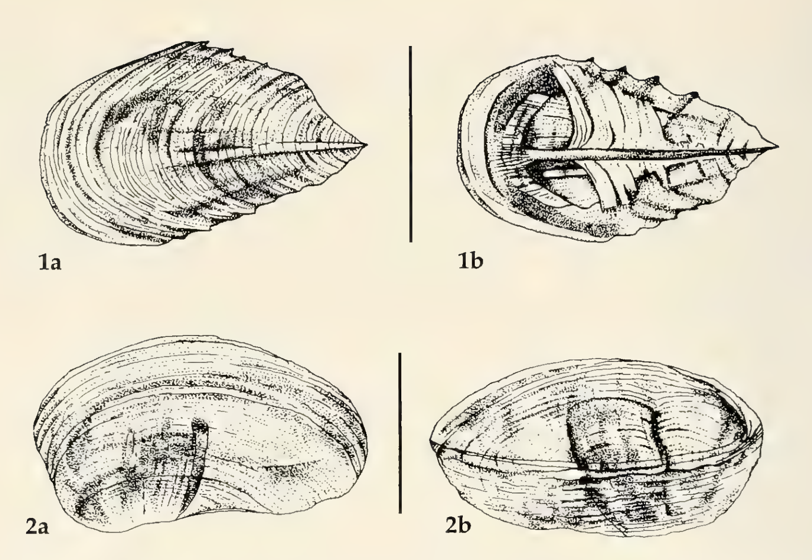


Fig. 1. *Xenophora (Austrophora) flindersi flindersi* Cotton & Godfrey. **1a.** Operculum, external surface. **1b.** Operculum, internal surface.
Fig. 2. Typical *Xenophora* s.str. (slightly generalized). 2a. Operculum, external surface. **2b.** Operculum, internal surface. Scale: 10 mm.

Discussion

Austrophora, subgen. nov. differs from *Xenophora s.str.* by its protoconch and operculum. *Xenophora s. str.* has a multispiral protoconch. The operculum of *Austrophora,* subgen. nov. resembles the operculum of Strombidae. Within Strombidae however, the operculum is sickle-shaped, and, if serrated, only serrated at one of the edges.

The opercula of all other Xenophoridae show a fairly consistent pattern with relatively little variation. They usually are subtriangular to suboval with smooth edges (the outer edge usually being worn away and rather ragged), with a nucleus near the outer edge. The external surface is typically rather smooth, with concentric growth lines and often microscopic radial scratches. The inner surface has an attachment scar and a non-attached area. The attachment scar occupies about half the inner surface and is usually kidney-shaped. The central area is deposited on top of the rest of the material of which the attachment scar is composed and projects into the attchment scar from its outer edge. The central area is laid down as a layer of radial units on top of the attachment scar which gives it a radially striate appearance (after Ponder 1983: 5). (Figs 2a-2b).

The only other known taxon of this new subgenus is *Xenophora flindersi ludbrookae* Ponder, 1983, a fossil from the Lower Pleistocene and possible Upper Pliocene of south Western Australia. It also shows a paucispiral protoconch, and is regarded as the direct ancestor of the recent species.

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Instinctive and intentional food storage by animals and man

Hermann Levinson and **Anna Levinson***

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It was assumed that during the neolithic period (e.g. ≈6000-3000 B.C. in predynastic Egypt) man has observed and copied the inborn behaviour of food storage displayed by certain animals including some species of ants, beetles, birds and rodents. The subterraneous stores of dung ball-rolling Scarabaeinae and dung-collecting Coprinae as well as the tree granaries of acorn woodpeckers (*Melanerpes formicivorus*) are impressive examples of instinctive storage behaviour performed by the adult animals.

Ancient literary sources, e.g. the biblical books of Genesis and Proverbs referring to Jacob's son Joseph (≈17th-16th century B.C.) and king Solomon (≈10th century B.C.) as well as the Greek author Aisopos (≈6th century B.C.) advocated the philosophy of storage and thrift, in order to prevent human misery resulting from failing harvests and human idleness.

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1. Introduction

Man has occasionally declared himself as the inventor of food storage and elaborate granaries (e.g. in archaic Egypt, ≈3050-2613 B.C.) ensuring the continuous availability of food reserves and seed supplies in relatively dry and hot regions (Levinson & Levinson 1985). It seems, however, that *Homo sapiens* has merely copied the inborn behaviour patterns of various food-storing species of insects, birds and mammals.

2. Food storage by insects, birds and mammals

It is well known that considerable food stores are kept by certain insect species pertaining to the nest-building Apidae, Formicidae, Termitidae and Scarabaeidae. Underground seed storage by harvesting ant species including *Messor avenarius, Messor barbarus, Messor structor* and *Pheidole providens* as well as underground storage of mammalian excrements by the subsocial species of dung ball rollers (Scarabaeinae) and dung collectors (Coprinae) reveal the ardent care of these insects for their food reserves. Some species of *Messor* gather seeds for storage from both plants and ground, remove the seed husks and discard them outside the nest; eventually they bite off the radicle, in order to prevent seed germination. Moreover, those ants carry moist seeds out of their nest, expose them to the sun-rays and return the dried seeds to the granary of their nest (Moggridge 1873).

* Dedicated to Prof. Dr. Giorgio Domenichini, Istituto di Entomologia e Patologia Vegetale, Università Cattolica del Sacro Cuore, Piacenza.

Remarkably enough, food-storing vertebrates mainly occur among mammals and birds, while amphibian, fish and reptile species do not seem to maintain food reserves. Most of the food-storing mammals are seed-consuming rodents: hamsters, gerbils (Cricetidae), flying and ground squirrels (Sciuridae) keep their seed reserves in hiding-places, whereas bark- and leaf-feeding beavers (Castoridae) maintain underwater stores of tree branches. Foxes and wolves (Canidae) bury their food reserves (mainly vertebrate flesh and bird's eggs), while the predatory moles (Talpidae) store up numerous immobilized earthworms and insect larvae in their subterraneous magazines.
Several species of crows (*Corvus*), jays (*Garrulus*), magpies (*Pica*), nutcrackers (*Nucifraga*), tits and chickadees (*Parus*) as well as woodpeckers (Picidae) reveal a marked instinct (= inborn behaviour pattern occurring in response to certain external stimuli) of storing seeds and nuts; they usually hide these nutrient resources in bark crevices, under lichens, among needles of pine trees, or in the soil, in order to overcome periods of food scarcity.

2.1. Dung storage by the Sacred scarab beetle

A unique way of providing an insect species with food reserves has been adopted by the scarab beetle *Scarabaeus (Ateuchus) sacer* [Linné 1758] as well as some other Scarabaeinae and Coprinae (Lamellicornia, Coleoptera). The dung ball rollers (Scarabaeinae) employ their cephalic and tibial protrusions of the forelegs as digging and raking tools for gathering recently deposited ruminant excrements, shape the latter mainly by their mid- and hindlegs into compact dung balls (diam. ≈ 4-5 cm) and roll them backwards to distant subterraneous and self-made nests (Fig. 1a, b). On the other hand, the dung collectors (Coprinae) stock masses of recently deposited ruminant excrements in underground burrows which they dig beneath dung heaps dropped by pasture animals.

The dung mass, comprising animal excrements, intestinal microorganisms and water, provides male and female scarab beetles (Scarabaeinae and Coprinae) with nutrients being essential for mating and reproduction. The females care for their offspring by converting the dung mass into compact pear-like structures serving as a shelter for the preimaginal stages and pharate adults as well as providing an ample food store to the growing larvae (Fabre 1897, 1899, Halffter & Matthews 1966, Halffter & Edmonds 1982).

The ancient Egyptians were attentive observers of animal life in the Nile valley and certainly noticed scarab beetles rolling their dung balls across the ground (Fig. 1a). The scholars of that time interpreted the above activity as an explanation of the sun's circuit from east to west. The sun-god Khepri was thus aptly manifest in the Sacred scarab beetle, and was believed to move the sun-disc in his journey from the Underworld across the sky. Moreover, the sun-god's name Khepri (= he who is coming into existence) had been first mentioned in the Pyramid texts of the fifth Dynasty (≈2465-2323 B.C.). The early Egyptians would have seen scarab beetles "emerging spontaneously" from dung balls (Fig. 1c) and imagined this chthonic beetle as a form of the creator-god Atum, who was self-produced without previous parental mating and postembryonic development (Levinson & Levinson 1996).

2.2. Nut storage by the acorn woodpecker

Melanerpes (Balanosphyra) formicivorus [Swainson, 1827] is a cooperatively breeding woodpecker and passionate acorn-storing bird occurring in several races which are resident in California, western Mexico, central America and northern Colombia (Fig. 2). Although this species is primarily feeding on insects (mainly Hymenoptera and Coleoptera), it has a pronounced predilection for acorns of several *Quercus* species such as *agrifolia, chrysolepis, douglasii, kelloggii* and *lobata* (Koenig & Mumme 1987). *Melanerpes formicivorus bairdi* [Ridgway, 1881] drills countless peck-holes into the bark layer of various trees including *Ficus, Pinus, Pseudotsuga, Quercus* and *Sequoia* storing there acorns and accasionally some other seeds and fruits, e.g. almonds, dates, eucalyptus, hazelnuts, maize, pecans and walnuts (Ritter 1929, 1938). The acorn woodpecker's instinct of storing is so dominant that the bird will peck holes also in timber structures including gables, cornices and telephone poles and fill them with inedible objects (e.g. pebbles of different size), whenever acorns are missing. Acorn woodpeckers usually feed on immature oak fruits as long as green acorns are available on the trees (mainly in late summer and early autumn), store mature acorns mainly in late autumn, while they feed on aged



a



b



c

Fig. 1a-c. Dung balls serving as food reserves for the scarab beetle *Scarabaeus (Ateuchus) sacer* [Linnaeus, 1758´] and their mythical significance in ancient Egypt. **a.** The two scarab beetles depicted in the background of the drawing are shaping their dung balls by adding more ruminant excrements, thus enlarging the balls and smoothing out their surface. The scarab beetle evident behind the larger dung ball (diam. ≈ 4.4 cm) lowers the head and raises his abdomen while moving the dung ball in backward direction. An additional scarab beetle attempts to steal the larger dung ball from his conspecific. – Drawn by R. Oeffinger (1908). **b.** Following transportation of the dung ball to a distant underground nest, the scarab beetle will ingest his compressed food reserves. Consumption of several dung balls is required to gain the capability of mating and reproduction in both sexes of *Scarabaeus sacer*. Subsequently, the fertile female lays a single egg into the neck-like projection of the brood-pear (not depicted), wherein the larva will grow, pupate and develop to an adult scarab beetle, subsequently penetrating the brood-pear and flying off. – Drawn by R. Oeffinger (1908). **c.** The early Egyptians imagined a scarab beetle, leaving the dung ball (called n w t) to be the sun-god at dawn (on the eastern horizon) and named him Khepri, i.e. literally: he who came into being. Solar resurrection was thus represented by Khepri as a scarab beetle emerging from his dung ball and unfolding his wings. As evident, the scarab beetle is pushing by his foreleg a small solar disc symbolizing the rising sun. Source: Wall painting in the Theban sarcophagus chamber of king Ramses VI (≈1151-1143 B.C.) as well as Book of the Earth, 3rd part, 11th scene (Hornung 1972, 1988).

(brownish) acorns of their tree granaries throughout winter (until the supply is exhausted).

Acorn woodpeckers insert their acorns into peck-holes of suitable size and push them well below bark level (Fig. 3b), first inserting the narrow tip of the fruit, while its broad base is facing the bird's bill. Acorns being deeply immersed to the holes of a tree granary are fairly well protected against pilferage by various species of birds and rodents (Ritter 1929, 1938). Some cooperative groups of *Melanerpes formicivorus bairdi* are capable of storing unusually large amounts of acorns within two or more years (Figs. 3a-c, Gunn 1972). Ritter (1929, 1938) reported that approximately 50000 acorns were found inserted in a large yellow pine and about 20000 acorns embedded in an old sycamore. Since the peck-holes of acorn woodpeckers rarely penetrate the cambial layer, it is improbable that tree granaries will have harmful implications on the host trees.

Acorns collected from tree granaries of *Melanerpes formicivorus bairdi* were found to comprise approximately 3.9-7.1 % protein, 5.6-26.5 % lipids, 12.6-17.4 % carbohydrates as well as 0.37-0.46 % of soluble tannins (based on dry weight of oak fruits). It follows that acorns represent an adequate source of nutrients, except for the soluble tannins which could bind to dietary proteins and thus reduce the

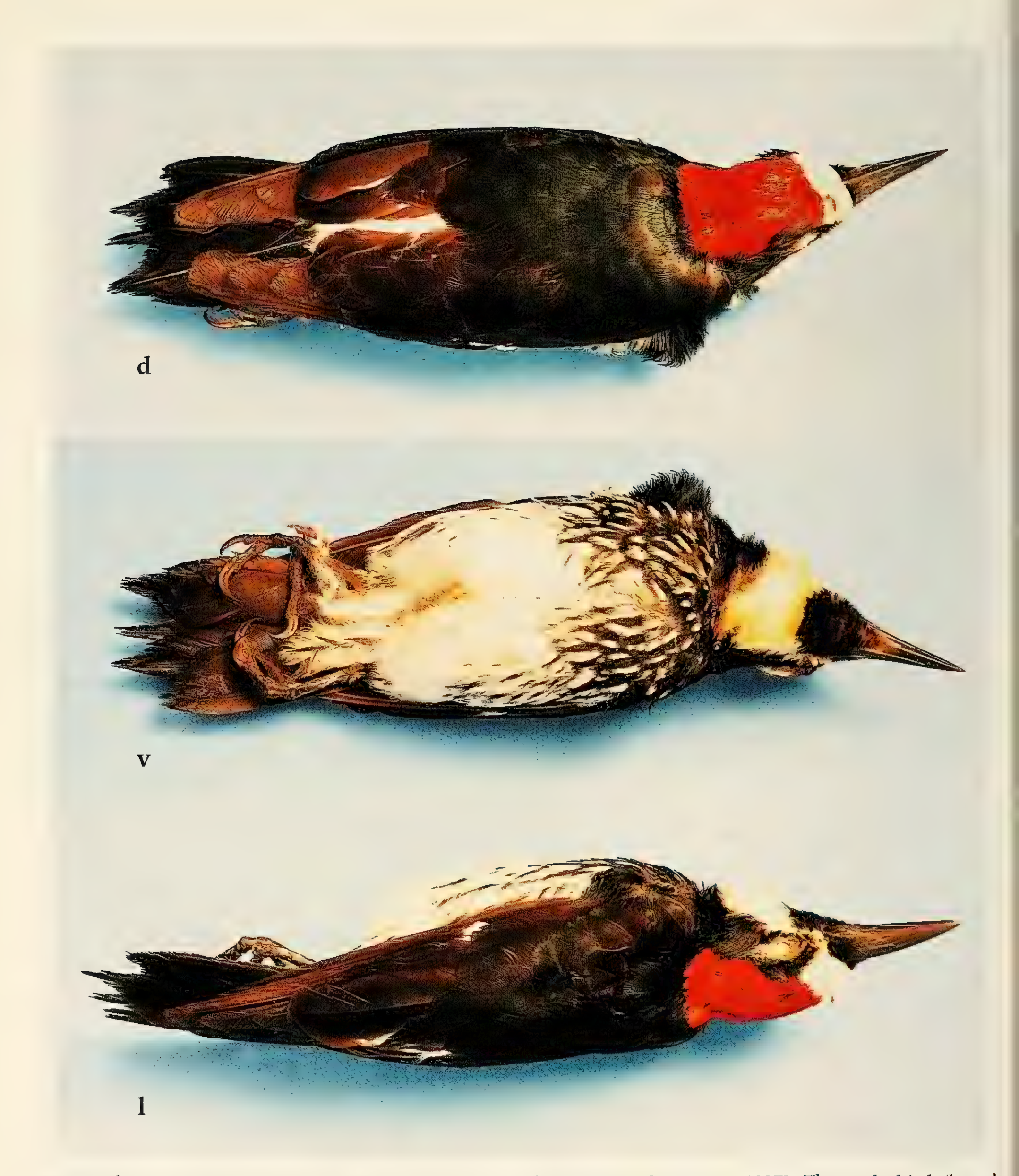


Fig. 2. The acorn woodpecker *Melanerpes formicivorus formicivorus* [Swainson, 1827]. The male bird (length ≈ 20-24 cm) is provided with a scarlet cap, whitish forehead and yellow throat, black orbitals, auriculars, nasal tufts and chin, whitish eyes, glossy greenish-black dorsum, glossy blackish forebreast, whitish/black-streaked hindbreast, a whitish ventrum as well as four toes on each leg. During flight, a white wing patch becomes bilaterally evident. The picturesque bird has a strong bill being adapted for puncturing the bark of forest trees (mainly oaks and pines) and storing therein acorns, other fruits and seeds (see also Fig. 3a, b). Male *Melanerpes formicivorus formicivorus* in dorsal (d), ventral (v) and lateral view (l). (Collection Dalmas 09.4142, Mexique Sciama, 1896 – ZSM).

digestibility of the latter by proteolytic enzymes (Koenig & Mumme 1987). On the other hand, the woodpecker's ability to tolerate dietary acorn tannins suggests the bird's adaptation to the latter, which may be related to a high pH level in the intestine and/or due to other means of tannin detoxification.

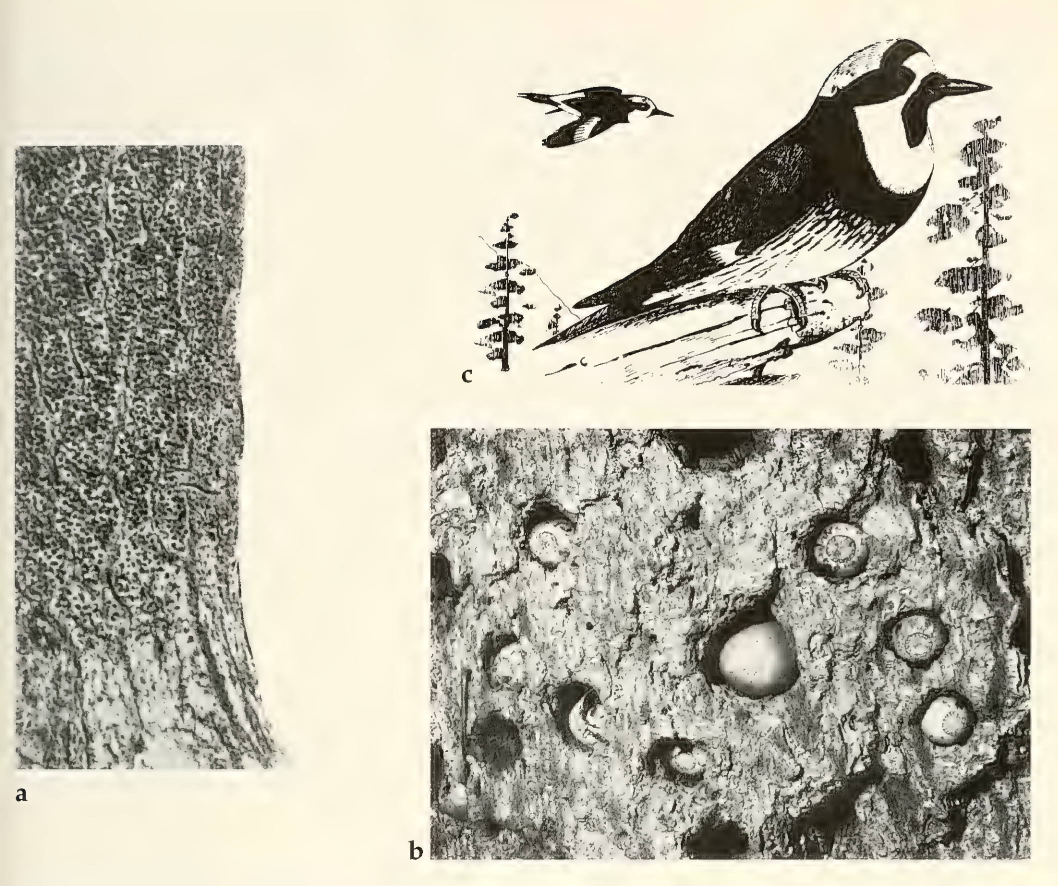


Fig. 3a-c. Tree granary established by cooperatively breeding *Melanerpes formicivorus bairdi* [Ridgway, 1881] in a Californian forest. **a.** Partial view of the trunk revealing numerous peck-holes which were drilled into the bark by the woodpecker's bill. The majority of the holes were filled with aged (brownish) acorns, while some of the pits were provided with seeds and nuts of different size (modified from Gunn 1972). **b.** Small region of the above tree granary (magnified ≈10 fold) showing smaller and larger acorns, driven into the holes until the acorn base is countersunk below bark level. The trees are scarcely harmed by the acorn woodpeckers, because their punctures in the bark fail to injure the cambium. **c.** Female *Melanerpes formicivorus bairdi* (≈⅓ of natural size) displays a transverse black band on her head which is lacking in the male. The flying acorn woodpecker (left corner) reveals the characteristic whitish rump and wing bands. The species feeds on insects mainly during spring and summer, while it stores acorns as well as other fruits and seeds in late autumn, consuming the latter mainly in winter.

3. Philosophy of food storage in antiquity

It is conceivable that "the philosophy of storing food in time, in order to provide sustenance for periods of lack" was derived from some striking events recorded in the books Genesis and Proverbs of the Bible. Jacob's son Joseph was superintendent of food supplies in ancient Egypt probably during the Hyksos' rule (≈1640-1530 B.C.) and took the following measures to prevent starvation of the population in a period of severe drought:

"They should collect all food produced in the good years that are coming and put the grain under Pharao's control as a store of food to be kept in the towns. This food will be a reserve for the country against the seven years of famine which will come on Egypt, and so the country will not be devastated by the famine." (Genesis **41**: 35-36).

"During the seven years of plenty when there were abundant harvests, Joseph gathered all the food produced in Egypt then and stored it in the towns, putting in each the food from the surrounding country. He stored the grain in huge quantities; it was like the sand of the sea, so much that he stopped measuring: it was beyond all measure." (Genesis **41**: 47-49).

"When the whole land was in the grip of famine, Joseph opened all the granaries and sold grain to the Egyptians, for the famine was severe." (Genesis **41**: 56).

The biblical Proverbs ascribed to king Solomon (≈10th century B.C.), comprise 31 chapters showing the way to righteousness and wisdom of mankind. Chapter 6 of the Proverbs condemns an easy-going, futile life and praises the dilligence and seed-storing habit of the harvesting ants:

"Go to the ant, you sluggard, observe her ways and gain wisdom. She has no prince, no governor or ruler; but in summer she gathers in her store of food and lays in her supplies at harvest. How long, you sluggard, will you lie abed? When will you rouse yourself from sleep?" (Proverbs **6**: 6-9).

It is likely that king Solomon's exhortative proverb made a lasting impression on philosophers and writers of classical antiquity. The Greek author Aisopos (6th century B.C.) expressed the same idea in his parable concerning the ant and the cicada: "Store seeds for the future whenever you can and never mind entertaining the travellers." It is worth recalling that a modified version of Aisopos's parable is still in use at present: "Save up reserves in time and you will overcome periods of want." (Gerr 1997).

4. Epilogue

In his attempts to develop measures of large-scale food storage, man has repeatedly tried to copy and improve the foraging and storing behaviour of certain animals. In this respect, the food-preserving behaviour patterns of several insect, bird and mammalian species were certainly useful guidelines for the inexperienced farmers of the neolithic period (≈ 6000-3000 B.C.). Finally one ought to pay homage to the food-storing animals mentioned in this communication for the invaluable lesson they have taught mankind at the dawn of civilization.

Zusammenfassung

Homo sapiens bezeichnete sich gelegentlich als Erfinder der Lebensmittelspeicherung im Altertum (die beispielsweise im frühdynastischen Ägypten zwischen 3050 und 2613 v. Chr. begann), während er eigentlich nur das angeborene Verhalten der Nahrungsspeicherung bei manchen Tierarten nachahmte. Man kann annehmen, daß die primitiven Bauern des Neolithikums (beispielsweise im Niltal ≈ 6000-3000 v. Chr.) die Anlage relativ geräumiger und gut gehaltener Nahrungsspeicher mancher Ameisen-, Käfer-, Vogel- und Nagetierarten beobachtet und nachgebildet haben. Die unterirdisch angelegten Speicher der Dungkugel-rollenden Scarabaeinae (Abb. 1a-c) bzw. Dung-eintragenden Coprinae sowie die – in Baumstämmen angelegten – Speicher der Eichelspechte *Melanerpes formicivorus* [Swainson] (Abb. 2 sowie Abb. 3a-c) wurden als repräsentative Beispiele besprochen.

Die biblischen Bücher Genesis (**41**: 35-36, 47-49 sowie 56) bezüglich Joseph, Vorsteher der Nahrungsspeicher Ägyptens (≈17.-16. Jh. v. Chr.), und Sprüche (**6**: 6-9), die dem weisen König Salomo (≈10. Jh. v. Chr.) zugeschrieben wurden, sowie die belehrenden Fabeln des griechischen Dichters Aisopos (≈6. Jh. v. Chr.) befürworten eine Philosophie der Sparsamkeit und Nahrungsspeicherung, damit die katastrophalen Folgen von Dürre und Mißernten nicht in Hungersnot und Müßiggang ausarten können.

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The Revised English Bible (Verse numbering according to the Authorized King James Version): Genesis **41**: 35-36, 47-49, 56 and Proverbs **6**: 6-9. – Oxford University Press and Cambridge University Press, 1989

16. Mindell, D. (ed.): Avian molecular evolution and systematics. – Acad. Oress, San Diego, N.Y., 1997, 382 + XX S., zahlr. schemat. Abb. ISBN 0-12-498315-4.

Diese Sammlung von 13 ausführlichen wiseenschaftlichen Arbeiten über Systematik und Molekularbiologie der Vögel hat ihren Ursprung im Symposium "Avian Molecular Evolution", abgehalten 15.-19.8.1995 in Cincinnati/Ohio, zu dem schon sieben Autoren beitrugen. Der Band gibt einen Überblick über neuesten Stand, Theorie und Anwendung molekularbiologischer Methoden. DNA-Sequenzierungstechniken, sei es von Kern-DNA, Mikrosatelliten-Stücken oder m-DNA, ermöglichen heutzutage die Aufhellung einiger Episoden der Evolutionsgeschichte der Vögel und der korrerekten Einordnung der Taxa. Aber auch weitergreifende Anwendungen werden aufgetan: Artbildungsprozesse, Evolution des Verhaltens und sogar Schutzstrategien für Habitate und ihre bedrohten Vogelarten. An der Basis der Forschung wird geklärt, welche molekularen "marker" Aussagekraft und Zweckmäßigkeit haben; sodann werden diese durch Vergleich mit herkömmlicher Phylogenetik und Kladistik getestet.

Zwei Beispiele seien herausgegriffen: 1. "Artbildung bei südamerikanischen und afrikanischen Vögeln in Bergregionen" von M. Roy et al. Die DNA-Feinanalyse ergibt bei Bürzelstelzern (Rhinocryptidae), daß Rassen- und Artbildung nicht unbedingt nach der meistverfochtenen Hypothese der "isolierten Rückzugsgebiete" (Refuge theory) erfolgen muß, sondern auch durch sukzessive Radiation aus klimakonstanten Gebirgsbereichen, die an sich schon eine hohe Artneubildungsrate haben, so daß eine Ausbreitung über Bergzüge gleicher Höhenlage und nicht über parapatrische Artbildung entlang eines Umweltgradienten erfolgen kann. Arten eines Hanges müssen demnach nicht monophyletisch sein.

2. "Studien fossiler Vogel-DNA – From Jurassic park to modern island extinctions" von A. Cooper. Die Methoden der DNA-Analyse aus fossilen Knochen oder Geweben sind erst gut 10 Jahre alt. Am besten, weil abgeschirmt und wenig zerfallen, erweisen sich Proben aus dem Inneren dicker Extremitätenknochen, wobei beim Extrahieren und Weiterverarbeiten äußerste Sauberkeit (Kontamination durch Schweiß, Aerosole, Klimaanlage, Testmaterial von rezenten Nachbararten!) gegeben sein muß. Die DNA-Daten aus Moa-Knochen belegen die relativ entfernte Verwandtschaft mit den Kiwis (2. Einwanderungswelle nach Neuseeland), Emus und Straußen in eine eigene Gruppe, die ebenfalls weit getrennt von den übrigen Ratiten, Nandus und Tinamus bleibt.

Insgesamt ein Band von Spezialisten für Spezialisten, dem nicht ohne akademische Kenntnisse beizukommen ist.

T. Mischler

17. Landolt, P. & M. Sartori (ed.): Ephemeroptera & Plecoptera – Biology – Ecology – Systematics. – MTL – Mauron+Tinguely & Lachat SA Fribourg/Switzerland, 1997, 569 pp.

In Fribourg (Schweiz) wurde vom 14. bis 20. August 1995 gemeinsam der Internternationale VIII. Ephemeropteren – Kongreß und der XII. Plecopteren – Kongreß abgehalten, an denen insgesamt 150 Wissenschaftler aus über 30 Ländern teilgenommen haben. In den insgesamt 79 einzelnen Artikeln, die weitgehend den Referaten entsprechen, werden die Themenkomplexe Biologie und Verhalten, Biogeographie und Verbreitungsmuster, Biodiversität und Umweltbezug, Ultrastrukturen, Physiologie und Methoden, Systematik und Taxonomie sowie Phylogenie und geschichtliche Aspekte vorgestellt. Dabei geben diese den derzeitigen Stand der Untersuchungen dieser Tiergruppen wieder. Die sensible Reaktion der Eintags- und Steinfliegenlarven auf veränderte Umweltbedingungen weist sie als "gute" Bioindikatoren aus, was jedoch ohne biogeographische Betrachtungsweise vielfach unkritisch gesehen wird. Für den Bearbeiter dieser Tiergruppen wie auch für den Limnologen weist diese vorliegende Zusammenfassung eine Fülle von neueren Forschungsergebnissen auf, auch wenn zwei Jahre seit dem Symposium selbst vergangen sind. Das Stichwortverzeichnis ist bedauerlicherweise etwas stark gekürzt ausgefallen und für eine Detailsuche ungegeignet. Der Preis dieses Symposiumsbandes läßt auch Bibliotheken und Studenten den Zugang zu, was auf die Zahl der Sponsoren zurückzuführen ist. Eine Nachahmung sei hier dringenst empfohlen.

E.-G. Burmeister

18. Alford, D.V.: Farbatlas der Schädlinge an Zierpflanzen. – Ferdinand Enke Verlag Stuttgart, 1997, 477 pp.

Auf über 1000 Farbabbildungen werden in diesem Band die in Europa vorkommenden Pflanzenschädlinge vorgestellt. Zusätzlich zu der meist hervorragenden Abbildung, bei der neben dem Schädling selbst auch vielfach das Schadbild zu sehen ist, wird die Verbreitung, die Beschreibung des Schadensverursachers und die Lebensweise vorgestellt. Vielfach folgen Angaben zum Schaden selbst und zur Bekämpfung, wobei biologisch zu rechtfertigende Maßnahmen den Vorzug genießen. Die Kenntniss der Arten, die als Schädlinge eingestuft werden, eine nutzungsorientierte anthropogene Zuordnung, macht eine gezielte Einschränkung der Schadwirkung durch spezifische Maßnahmen möglich. Dazu trägt dieser Bildband entscheidend bei. Der Titel ist jedoch zu bescheiden, da neben Zierpflanzenschädlingen auch solche der natürlich verbreiteten Bäume und Sträucher behandelt werden. Die systematische Einteilung und die kurze Vorstellung der behandelten Tiergruppen erleichtern das Auffinden der Arten ebenso wie das sehr umfangreiche Sachverzeichnis. Natürlich kann dieser Farbatlas kein Bestimmungsbuch sein, dennoch hilft er bei der Identifizierung des "Schädlings" und des Schadbildes entscheidend weiter. Für jeden Pflanzen- und Gartenbewirtschafter, sowie Verantwortliche im Garten- und Landschaftsbau, Entomologen und Forstwirtschaftler wird dieses Buch eine unentbehrliche Hilfe sein.

E.-G. Burmeister

19. Beck, H. (ed.): Alexander von Humboldt – Die Forschungsreise in den Tropen Amerikas. – Wissenschaftliche Buchgesellschaft Darmstadt, 1997, 3 Bd.

Zum 125 Todestages des berühmten Naturforschers, vom Herausgeber im Impressum bedauerlicherweise immer nur als Geograph bezeichnet, ist diese Reisebeschreibung als 2. Band in drei Teilen des Lebenswerkes von A. v. Humboldt erschienen. Als Vorlage diente die französische Orginalausgabe und die einzige vollstänbdige deutsche Übersetzung aus dem Jahre 1832. Die Angaben Humboldts sind herausgehoben, die Kommentare ermöglichen eine heutige Sichtweise. Die Reise nach und durch Südamerika von 1799 bis 1804 ist nicht nur unter den zeitlich bedingten Verhältnissen eine Leistung, die auch nach heutigem Kenntnisstand nie wieder erreicht wurde. Die detailgenaue Widergabe der Erlebnisse und die Beschreibung der Reiseroute ist eine Meisterleistung. Auch die aufklärerische Sichtweise wird nicht nur bei der Wahrnehmung der Natur sondern auch bei der Beschreibung der Bevölkerung, Wirtschaftsstruktur und Sozialgeschichte und besonders der Menschenrechtssituation deutliich. Das Werk selbst läßt sich nicht werten, der Dank gilt dem Herausgeber und Leitperson der Humboldt-Forschung Professor Hanno Beck, daß er sich dieser Dokumentation angenommen hat, auch wenn Humboldt als der Naturforscher, ob Zoologe, Botaniker, Ökologe, Ethologe, Geologe, Klimatologe etc. nicht deutlich herausgestellt wurde. Die Übernahme einiger der Abbildungen des Reisebegleiters A. Bonpland hätte diesen Bänden sicher gut getan, zumal diese zur Reise unmittelbar gehören. Das Attribut Naturforscher, das möglicherweise antiquiert erscheint, aber eher auf Grund des universellen Anspruches in der Welt der Spezialisierung keinen Platz mehr findet, konnte nach Humboldt, der neue Maßstäbe setzte, kaum einer Person folgender Generationen verliehen werden.

E.-G. Burmeister

20. Wermuth, H. & R. Mertens: Schildkröten, Krokodile, Brückenechsen. – Gustav Fischer Verl., Jena, 1996 (1961). 506 S., 271 Abb. ISBN3-437-35048-X.

Endlich ist ein Nachdruck des 1961 erschienenen Standardwerkes über Schildkröten, Krokodile und die Brükkenechse herausgekommen. Erweitert wurde er durch einen Nachtrag von F. J. Obst, ebenfalls ein hervorragender Schildkröten- und Panzerechsenkenner. Der Hauptteil des Buches entspricht genau der 1961 erschienenen Erstausgabe. Dadurch blieb unter anderem der Reiz der zeitlos gültigen Schwarzweiß-Abbildungen erhalten. In einem ausführlichen Anhang hat F. J. Obst das Werk dann allerdings aktualisiert. Zunächst werden die von 1961 bis 1996 neu beschriebenen Arten und Unterarten angeführt; es sind 117 Taxa bei den Schildkröten und 4 Taxa bei den Krokodilen. Dann folgt eine Tabelle, die in einer Art "Synonymieliste" die Gültigkeit und Veränderungen der Gattungs-, Art- und Unterartnamen in dem behandelten Zeitraum vermerkt. Dabei wird Bezug genommen auf die wichtigsten monographischen Bearbeitungen durch Wermuth und Mertens, Pritchard, Iverson, Ernst und Barbour, King und Burke, David sowie Obst bei den Schildkröten und Wermuth und Mertens, Wermuth und Fuchs, King und Burke, Ross, Steel, Grenard, Penny sowie Trutnau bei den Krokodilen. Daß der kommentierende Text des Anhangs sowohl in Deutsch als auch in Englisch erscheint, macht das Buch für den Gesamtbereich wissenschaftlich arbeitender Herpetologen besonders wertvoll.

U. Gruber

21. Engelhardt, W.: Das Ende der Artenvielfalt – Aussterben und Ausrottung von Tieren. – Wissenschaftliche Buchgesellschaft Darmstadt, 1997, 130 pp.

Bücher über den Artenschwund und das Aussterben von Organismen auf dem Planeten Erde haben Hochkonjunktur und politische Brisanz, sind jedoch bisher ohne durchschlagenden Erfolg geblieben. Am fehlenden Engagement der Autoren kann es nicht gelegen haben, wohl aber an der Polemik, die hier immer wieder so auch in diesem kleinen Bändchen zum Ausdruck kommt. Die Hochrechnungen von Individuenverlusten, z.B. durch den Walfang, auf Arten umzurechnen und die tägliche Aussterberate damit zu ermitteln, ist höchst zweifelhaft und wird von den Verursachern des Schwundes bis hin zum Bevorteilten nur belächelt. Auch die von Engelhardt stets wiederholend mit erhobenem Zeigefinger ausgesprochenen Mahnungen zeigen keine Wirkung, wenn nicht reale Fakten dokumentiert werden. Immer wieder von Seiten eines Mitteleuropäers den Schutz der Regenwälder als Massenrefugium von Arten zu forden, die heimische Natur jedoch "ordnungsgemäßer" Land- und Forstwirtschaft zu überlassen, wirkt unglaubwürdig. Die Hinweise zur Verlangsamung des Artensterbens weisen Tendenzen der vereinfachten Schutzgebietsausweisung aus: Käseglocke über das Habitat seltener Arten, unter Ausschluß des Menschen, der allein das Schutzziel in Zeit und Raum zu erkennen vermag. Wissenschaftlich erstellte Rote Listen in ihrer politisch orientierten Anwendung, als positiv darzustellen, zeigt Praxisferne. Kritik fehlt gerade in dieser Zusammenfassung in Teilbereichen wie der Zuordnung "seltener Arten" oder bei der Propagierung von Artenhilfsprogrammen, wobei es sich fast ausnahmslos um Großtiere handelt, obwohl doch die Insekten, vielfach noch unbekannt, täglich in Kohorten von 300-400 Arten aussterben. Die Ursache mehrfach wiederholend im Bevölkerungswachstum zu sehen, ist sicher richtig, verlangt aber als Konsequenz den Hinweis auf ein biologisches Phänomen, daß die Knappheit an Resourcen (Armut) die "Produktion" von Nachkommen bedingt. Die Wiederholung der Wilson'schen Ausführungen ist an Politiker gerichtet nicht aber an ernsthafte Naturschützer, die nicht mit Artenschützer gleichzusetzen sind! E.-G. Burmeister

22. Roze, J. A.: Coral Snakes of the Americas: Biology, Identification and Venoms. – Krieger Publishing Company, Malabar, Florida, 1996. 328 S., 112 Farbabb., 61 Schwarzweißabb., 38 Karten. ISBN 0-89464-847/0.

Eine umfassende Darstellung der neuweltlichen Korallenottern muß man hochwillkommen heißen. Der Autor, ein anerkannter Fachmann für diese Elapiden-Gruppe, legt ein außerordentlich detailliertes Werk vor, das von der Namensgebung und Biologie bis zur Identifikation, Systematik und Verbreitung reicht. Nach einer allgemeinen Einleitung, bei der auch Namensgebung, Beziehung zum Menschen und Fragen der Artenbedrohung zur Sprache kommen, folgen die eigentlich biologischen Kapitel: äußerer und innerer Bauplan; Biologie und Evolution mit den Unterkapiteln Ökologie, Ernährung, Fortpflanzung, Feinde und Abwehrverhalten, Mimikry, Biogeographie und Stammesgeschichte. Ein ausführlicher Abschnitt beschäftigt sich sodann mit dem Komplex Gifte, Giftapparat, Chemie und Wirkungsweise der Gifte sowie Verhalten bei Giftbissen. Schließlich werden, nach einem praktikablen Bestimmungsschlüssel, die einzelnen Arten und Unterarten vorgestellt. Das Vorstellungs-Schema ist übersichtlich und umfaßt Synonymie, Verbreitung, Definition, Beschreibung, Größe, Bemerkungen, Nahrung, Referenzen und Etymologie. Soweit Unterarten beschrieben wurden, ist ein entsprechender Bestimmungsschlüssel der Artbesprechung beigegeben. Schließlich folgen Verbreitungskarten und ein umfangreicher, farbiger Bildteil, der die Bestimmung hilfreich ergänzt. Das Literaturverzeichnis ist sehr ausführlich; ein Index, unterteilt nach Autoren, Sachangaben und wissenschaftlichen Namen, ist selbstverständlich vorhanden. Das Buch kann, mit seiner hervorragenden Aufmachung und Übersichtlichkeit, jedem Interessenten für Korallenottern wärmstens empfohlen werden. U. Gruber

23. Jarofke, D. & H. J. Herrmann: Amphibien; Biologie, Haltung, Krankheiten, Bioindikation. – Ferdinand Enke Verl., Stuttgart, 1997. 139 S., 40 Farbabb., 37 Schwarzweißabb. ISBN 3-432-27651-6.

Ein kleines Büchlein, das als kurz gefaßte Anleitung zur Pflege und Krankheits-Behandlung von Amphibien verstanden werden kann. Insofern wendet es sich nicht nur an den Wissenschaftler, sondern vor allem an den Terrarianer. Einführend wird die allgemeine Biologie der Amphibien besprochen, aufgeteilt nach Bauplan, Stammesgeschichte und Systematik, Fortpflanzung und Entwicklung, Verhalten, Lebensräumen und Lebensbedingungen. Im zweiten Kapitel kommen Pflege, Unterbringung, Fütterung und Zucht zur Sprache. In zwei weiteren Kapiteln wird auf die Schutzgesetzgebung und die Rolle der Amphibien als Bioindikatoren eingegangen. Schließlich folgt der umfangreiche, tiermedizinische Teil, der mit den Untersuchungsmethoden beginnt. Das Kapitel Infektionskrankheiten und infektiöse Parasiten ist umfangreich und für den Terrarianer sehr nützlich. Das Gleiche gilt für die Besprechung der Organkrankheiten, welche die Erkrankungen der Haut, des Skelettsystems, der Verdauungsorgane, Atmungsorgane, Kreislauforgane, Harn- und Geschlechtsorgane sowie Sinnesorgane umfaßt. Schließlich kommen auch Intoxikationen durch verunreinigtes Milieu und Futter, Neoplasien und Mißbildungen, Narkose, Behandlungsmethoden und chirurgische Eingriffe zur Sprache. Wichtig sind die Hinweise auf das Töten unheilbar erkrankter Tiere unter Berücksichtigung der gesetzlichen Bestimmungen. Im Anhang findet sich eine tabellarische Übersicht von Medikamenten mit Indikation, Dosierung und Anwendung sowie eine Übersicht der wichtigsten klinischen Veränderungen bei Amphibien. Das Werk endet mit einem außerordentlich umfangreichen Literaturverzeichnis. Alle Amphibienpfleger werden sich über das Buch freuen, denn es ergänzt die 1961 erschienene Schrift zu Amphibienkrankheiten von H. H. Reichenbach-Klinke in anschaulicher und verständlicher Weise.

U. Gruber

24. Schaefer, C.: Das große Buch der Welse. – bede-Verlag, Ruhmannsfelden, 1996. 295 S., mehr als 1000 Farbbabb., 12 Textabb. ISBN 3-927997-55-2.

Ein Prachtband über die mehr als 2000 Arten umfassende Gruppe der Welse, mit einer unglaublichen Fülle von Farbbabbildungen. Nach einem Einführungstext, der Bauplan, Biologie, Verbreitung und Verwandtschaftsbeziehungen der Welse behandelt, folgt der spezielle Teil. Er stellt 34 Familien vor, unter denen die Stachelwelse (Bagridae), die Callichthyidae mit den Panzerwelsen (Corydoradinae), Harnischwelse (Loricariidae), elektrischen Welse (Malapteruidae), Fiederbartwelse (Mochokidae), Antennenwelse (Pimelodidae) oder die Echten Welse (Siluridae) hervorzuheben wären. Der jeder Familie oder Unterfamilie vorangestellte Text ist kurz gefaßt, wodurch man mehr Raum für die Fülle der Abbildungen erhält. Am Ende steht ein L-Nummern-Register, bestehend aus Farbbabildungen und Tabellen, mit insgesamt 234 Taxa der Harnischwelse. Dieses Register dürfte für Aquarianer besonders interessant sein. Abschließend findet sich ein ausführliches Literaturverzeichnis und ein Register. Sicherlich zieht der Fachmann wie auch der Aquarianer gleichermaßen Nutzen aus diesem reich bebilderten Werk.

U. Gruber

25. Paepke, H. J.: Die Stichlinge (Gasterosteidae). – Die Neue Brehm Bücherei Bd. 10, Westarp Wissenschaften, Magdeburg, 1996, 175 S., 78 schwarzweiße Abb., 1 Farbtaf., 4 Tab. ISBN 3-89432-492-9.

Die 2. Auflage der kleinen Monographie über die Stichlinge folgt der bewährten und qualitativ anspruchsvollen Aufmachung der Werke aus der Neuen Brehm Bücherei. Der umfangreiche Stoff ist gut geordnet. Nach einer allgemeinen Einführung in die Familie der Gasterosteidae, mit Morphologie, Verbreitung, Biologie, Ökologie, Evolution und Verwandtschaftsbeziehungen, folgt ein Bestimmungsschlüssel der Gattungen, Arten und Unterarten. Im umfangreichen, speziellen Teil werden die Gattungen *Spinachia, Pungitius, Culaea, Apeltes* und *Gasterosteus* behandelt; die einzelnen Abschnitte umfassen Körperbau und Färbung, Verbreitung, Ökologie, Alter und Wachstum, Fortpflanzungsbiologie, Populationsdynamik sowie innerartliche Differenzierungen. Am Ende wird auf die wirtschaftliche und landeskulturelle Bedeutung der Stichlinge für den Menschen sowie auf Fang, Haltung und Pflege im Aquarium eingegangen. Die zahlreichen Abbildungen illustrieren den Text auf anschauliche Weise. Das abschließende Literaturverzeichnis ist außerordentlich umfangreich. Man kann den informativen Band sowohl dem wissenschaftlichen Fachmann als auch dem anspruchsvollen Terrarianer empfehlen.

U. Gruber

26. Brabenetz, E., F. Luttenberger & R. Fesser: Haltungsrichtlinien, Mindestansprüche für Giftschlangen und andere Gifttiere. – Literas Universitätsverl., Wien, 1997. 68 S., 42 Farbabb. ISBN 3-85429-145-0.

Die Namen der Autoren, alle drei prominente Mitglieder in der Herpetologischen Terraristischen Vereinigung Österreich, bürgen schon für die Qualität dieser Broschüre, die ausgesprochen praxisorientiert ist. Vorwiegend kurze Textabschnitte, Stichworte und Tabellen reduzieren die Information auf das Nötigste. Das beginnt sofort mit den für die Gifttierhaltung wichtigsten Aspekten, der Sicherheit und den medizinischen Maßnahmen bei Unfällen. Die behandelten Kapitel sind hier: Sicherheitsbestimmungen bei der Haltung von Giftschlangen, Maßnahmen zur ersten Hilfe nach Schlangenbissen, Verhalten bei Schlangenbissen, Hinweise für den Rettungsarzt. Nach den Voraussetzungen zur Haltung von Giftschlangen und anderen Gifttieren folgt eine Checkliste für Reptilienhaltung und eine seitenlange, tabellarische Auflistung der am häufigsten gehaltenen Gifttiere im Hinblick auf ihre Pflegeansprüche. Dabei werden nicht nur Giftschlangen berücksichtigt, sondern auch Vogelspinnen, Skorpione, Hundertfüsser und wasserbewohnende Gifttiere. Schließlich folgen eine Tabelle der laut Tierschutzgesetz in Niederösterreich verbotenen Gifttierarten, ein weiterführendes Literaturverzeichnis, eine Liste der österreichischen Artenschutzbehörden und einige Seiten mit farbigen Abbildungen von charakteristischen Gifttieren. Das praktisch verwendbare Bändchen gehört in die Hand eines jeden Terrarianers, der sich mit giftigen Tieren beschäftigt und enthält auch viel Nützliches für den Fachmann. U. Gruber

27. Djumic, A.: Der vernachlässigte Edelfisch: Die Äsche (Status, Verbreitung, Biologie, Ökologie und Fang). – Facultas Universitätsverl., Wien, 1997. 111 S. 50 teilw. farbige Abb., 20 Tab. ISBN3-85076-444-3.

Eine kleine Monographie der europäischen Äsche (*Thymallus thymallus* Linnaeus, 1758), verfaßt von einem engagierten und überdies "studierten" Aquarianer. Dieser Fisch nimmt unter den heimischen Fischarten einen ganz wichtigen Platz ein, denn er ist der Leitfisch der sogenannten "Äschenregion" in den Flüssen unterhalb der Forellenregion. Durch menschlichen Einfluß ist die Art dort heute höchst gefährdet. Der Band beginnt mit einer Darstellung der Systematik in der Gattung *Thymallus* und führt weiter zur Taxonomie und Verbreitung der europäischen Äsche. Es folgen die Beschreibung der Habitate, Untersuchungen zur Ernährung und zum Wachstum, ein ausführliches Kapitel über die Fortpflanzung, der Lebenszyklus, Hinweise zur Altersbestimmung, eine Abhandlung über den fischereitechnischen Fang sowie die Besprechung von Gefährdung und Schutz der Äsche. Viele Abbildungen und Tabellen vertiefen den Text. Eindrucksvoll ist das ausführliche Literaturverzeichnis; ein Index bildet den Abschluß. Man wünscht dem Bändchen eine weite Verbreitung bei Fischern, Fisch-Wissenschaftlern und Naturschützern. U. Gruber

28. Stiassny, M. L. J., L. R. Parenti & G. D. Johnson (Herausg.): Interrelationships of fishes. – Academic Press, San Diego-London-Boston-New York-Sydney,Tokyo-Toronto, 1996. 496 S., zahlr. Schwarzweißabb. u. Tab. ISBN 0-12-670950-5.

An diesem Band über die phylogenetischen Beziehungen der Fische haben neben den drei Herausgebern 28 weitere Autoren mitgewirkt. Somit ist ein hochqualitatives Kompendium der stammmesgeschichtlichen Verknüpfungen in dieser größten Wirbeltierklasse entstanden. Die Basis liefern morphologische – vor allem osteologische – Darstellungen und Vergleiche. Im einzelnen werden die folgenden Gruppen behandelt: Neoselachier (Chondrichthyes: Euselachii), Elasmobranchier, Batoidea, Acipenseriformes, Neopterygier, Teleostei, Osteoglossomorpha, Elopomorpha, Clupeomorpha, Ostariophysier, Euteleostea, Stomiiformes, Aulopiformes, Myctophiformes, acanthomorphe Fische und Sarcopterygier. Jeder Einzelbeitrag ist mit erklärenden Abbildungen und Tabellen ausgestattet und wird durch ein ausführliches Literaturverzeichnis abgeschlossen. Die äußerst konzentrierten Texte setzen ein hohes, spezialisiertes Fachwissen voraus. Wichtig ist dieses Buch für die Bibliotheken an Universitäten, freien Forschungsstätten und Forschungsmuseen. U. Gruber

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First record of *Metacyclops stammeri* Kiefer, 1938 from Balkan Peninsula

(Crustacea, Copepoda)

Tomislav Karanovic

Karanovic, T. (1999): First record of *Metacyclops stammeri* Kiefer, 1938 from Balkan Peninsula (Crustacea, Copepoda). – Spixiana **22/3:** 193-198

The cyclopoid copepod *Metacyclops stammeri* Kiefer, 1938 (Copepoda, Cyclopoida) is recorded from Balkan Peninsula for the first time. This species was known only from the Apulian region in the southern part of Italy. A detailed description of that interesting Tertiary relict is given.

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Introduction

Metacyclops was first established as a subgenus of the genus *Mesocyclops* by Kiefer (1927, 1928), and later as a genus (Kiefer 1937, 1960). Lindberg (1961) redefined the genus *Metacyclops* and also gave a key to females. He emphasized the distinctive features of that genus. One unsuccessful attempt to unite the three genera *Apocyclops, Psammophilocyclops,* and *Metacyclops* as subgenera of the genus *Metacyclops* was made by Plesa (1981). This grouping was followed by Pesce (1985a), but Reid (1987) showed the unnecessarity of that attempt. Forty-seven currently recognized taxa were listed in a world key by Herbst (1988), together with their geographical distribution. Reid (1991) added to the above list *Mesocyclops pseudoanceps,* which proved to be a *Metacyclops*. Recently described species and subspecies not included in Herbst's key are: *M. postojnae* Brancelj, 1987 from Slovenia; *M. janstocki* Herbst, 1990 from Antigua; *M. leptosus totaensis* Reid et al. 1990 from Colombia; *M. cushae* Reid, 1991 from the United States; *M. oraemaris* Rocha, 1994 from Brazil; *M. hirsutus* Rocha, 1994 also from Brazil; *M. mendocinus insulensis* Defaye & Dussart, 1991 from the Azores; and *M. geltrudeae* Galassi & Pesce, 1994 from Venezuela. Therefore, now the genus *Metacyclops* includes fifty-six species and subspecies of which the majority are tropical and temperate in distribution.

Kiefer (1938) described two species of the genus *Metacyclops* from the Apulian region in Italy: *M. subdolus* and *M. stammeri. M. subdolus* was latter rediscovered in Apulia (Pesce et al. 1978), and was also found on the Baleares, on Corsica and in Greece (Lindberg 1956, Pesce 1978, 1983, Pesce & Maggi 1981, 1983). *M. stammeri* was also rediscovered in several localities in Apulia (Pesce et al. 1978), but was never found outside that region. During an investigation of the copepod fauna in Montenegro two males of *Metacyclops stammeri* were found. It is the first record of that species from Balkan Peninsula.

Methods

Samples were collected with different types of hand-nets and little rubber pumps. The material was preserved by adding several drops of 36% formaldehyde, and very soon after that washed, and copepods were separated and removed into 70% ethanol. One specimen was dissected in a mixture of distilled water and glycerol (1:1),

with fine entomological needles. All drawings have been prepared using a drawing attachment on a Leica DMLS microscope with C-PLAN achromat objectives. Dissected appendages were preserved in Faure's medium. The not dissected specimen was, after examination, again preserved into 70 % ethanol.

Abbreviations used in the text and figures: Fu: furca; A1: antennula; A2: antenna; Mx: maxilla; P1-P6: 1st-6th leg; Enp: endopodite; Exp: exopodite; Enp2P4: second endopodite article of the 4th leg.

Results

Metacyclops stammeri Kiefer, 1938

Metacyclops Stammeri Kiefer, 1938, p. 7, figs 11-17;
Metacyclops stammeri, Lindberg 1961, p. 142; Dussart 1969, p. 173, fig. 85; Pesce et al. 1978, p. 37, fig. 5; Kiefer 1978, p. 215; Pesce 1985, p. 135; Dussart & Defaye 1985, p. 100; Lescher-Moutoue 1986, p. 308; Herbst 1988, p. 150.

Material examined: Two ♂♂ from the cave Sutimska Jama (42°25'50" N, 19°10'40" E), near the town Podgorica, Montenegro, collected by T. Karanovic, 3 February 1997. One ♂ was comletely dissected and monted on a slide in Faure's medium (No. 8/66/0584/i). The other ♂ is preserved in 70 % ethanol in a glass test tube (No. 7/0584/i). Both specimens are deposited in the author's working collection, at the Institute of Marine Biology, Kotor, Montenegro.

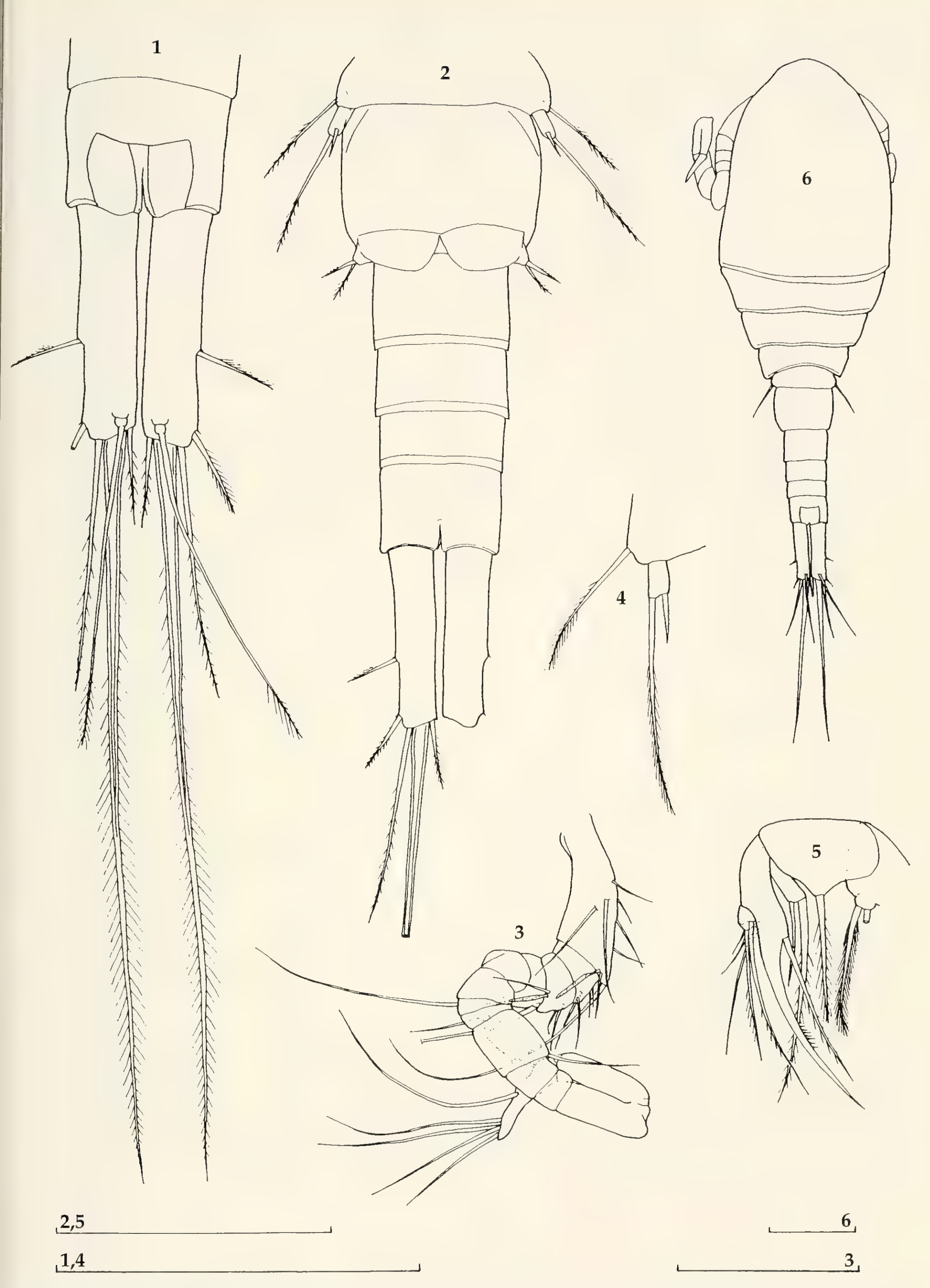
Description

Male. Length of dissected specimen, including furcal rami (excluded furcal setae) 0.54 mm. Length of non-dissected specimen 0.593 mm. Body surface without patterns of cuticle striae or setulose areas, and colourless. Nauplius eye absent. Hind margin of each body segment smooth and without rows of spines (Fig. 6). Cephalothorax very long (longer than thoracic somites and four abdominal somites together). Anal somite also without rows of spines at the base of furcal rami, both ventrally and dorsally (Figs 1, 2). Anal operculum very short and broad. Furcal rami parallel, close, and about 4 times longer than wide (Fig. 1). Lateral seta inserted at distal three-fifths of ramus. Apical setae with following proportion of lengths (from outside to inside: 1/2.8/8.4/1. Inner-middle seta (the longest one) swollen at base, and without cuticular pint. Dorsal seta attached almost at the end of the furcal ramus, and about 1.4 times longer than it. That seta is also longer than outer-middle seta (Fig. 1). A1 geniculate, 14-segmented, and with aesthetascs only at first and third segments (Fig. 3). A2 4-segmented, with well-developed exopodite seta, and without rows of spines or hairs on the first segment (Fig. 10). All swimming legs with 2-segmented exopodites and endopodites. Spine formula of distal exopodite articles P1-P4: 3.4.4.3; setal formula of those articles: 5.5.5.5 (Figs 7, 9, 11, 12). Enp2P4 approximately 3.2 times as long as width, apically armed with outer spine and inner plumose seta (which is more than twice longer than spine). Intercoxal plates in all swimming legs smooth and without hairs or spinules. P5 consisting of 1 fused and 1 free article (Fig. 4). Free article longer than width, armed apically with very long outer plumose seta, and inner spine (which is about 1.3 times longer than article that bears it). Seta on free article 1.5 times longer than seta on fused article. P6 armed with two appendages: inner spine and outer seta (Fig. 8).

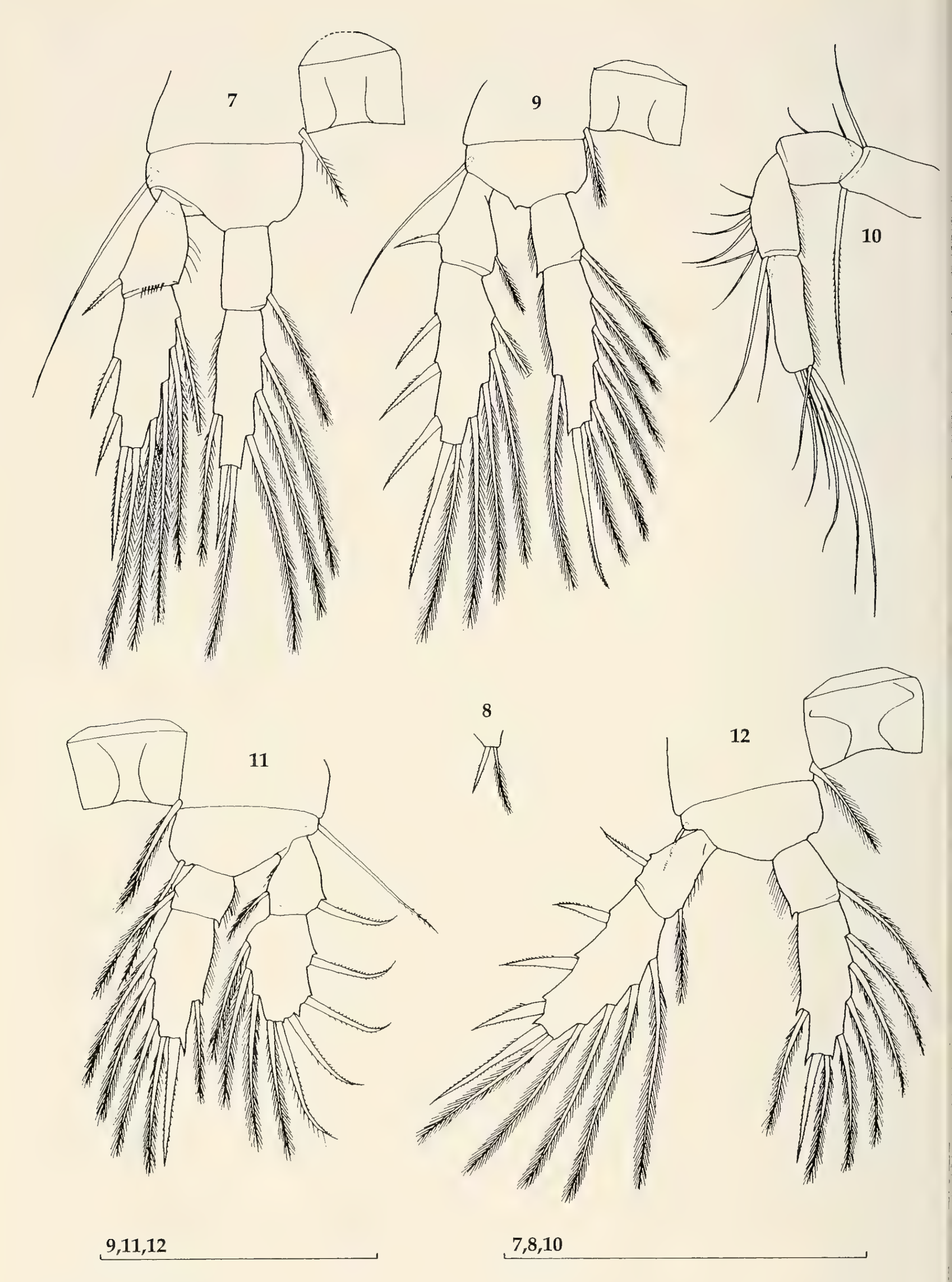
Discussion

Kiefer (1938) described *M. stammeri* from three caves (La Zinzuleisa, Abissa, and Grotta dei Diavoli), south from the town Otranto, in the Apulian region of southern Italy. Pesce et al. (1978) rediscovered it in the same caves, and also on four additional localities near the town Gallipoli, also in the Apulian region (Fig. 13), although their geographical coordinates are erroneous. Dussart & Defaye (1985) by mistake recorded the species from Corsica, Sicily, and Sardinia, as well as Herbst (1988), probably because of the wrong interpretation of Kiefer (1978). Specimens from Montenegro are very similar to those from the Apulian region, and there is no doubt of their specific status. They differ just by a little longer dorsal setae on Fu.

Metacyclops stammeri Kiefer, 1938 is clearly distinguishable from all species in the genus by the shape of Enp2P4 and Fu. Only *M. postojnae* Brancelj (1987) from Slovenia possesses similar Enp2P4, but it has different body habitus and shape of Fu. Similar body habitus and reduction of outer-middle seta



Figs 1-6. *Metacyclops stammeri* Kiefer, 1938. **1-5.** ♂ (0.54 mm). **6.** ♂ (0.593 mm). **1.** Anal somite & Fu, dorsal view. **2.** Abdomen, ventral view. **3.** A1. **4.** P5. **5.** Mx. **6.** Habitus, dorsal view. Scales: 0.1 mm.



Figs 7-12. *Metacyclops stammeri* Kiefer, 1938, ♂ (0.54 mm). **7.** P4. **8.** P6. **9.** P3. **10.** A2. **11.** P1. **12.** P2. Scales: 0.1 mm.

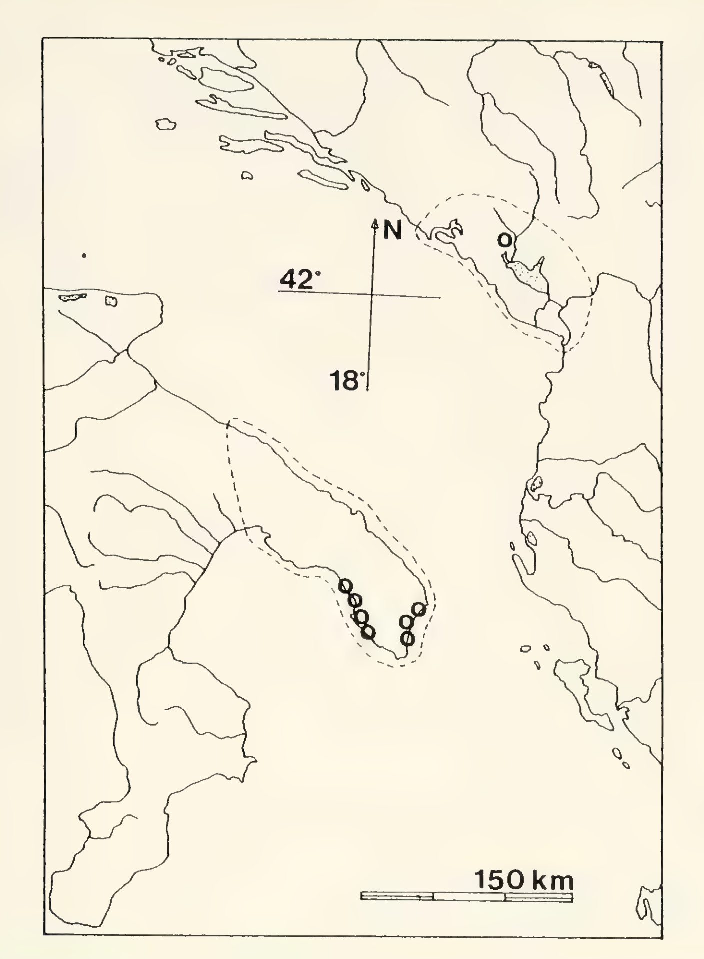


Fig. 13. Distribution of *Metacyclops stammeri* Kiefer, 1938 (circles: localities; broken line: supposed border of distribution).

on Fu has *M. trisetosus* (Herbst, 1957), described from Croatia and rediscovered in northern Italy by Stoch (1988), but it differs by the shape of P4, and the outer-middle seta on Fu is completely reduced in that species.

M. stammeri is one of the Tertiary relicts that have survived Quaternary cyclic periods of the ice ages in the subterranean waters. Its recent distribution (Fig. 13) is probably the consequence of the last ice age, which drive it into two refuge pockets (Apulian karstic peninsula, and Skadar karstic valley). Its return to the north areas in Balkan Peninsula is thwart by geographical obstacles and also by the presence of three subterranean species from the genus *Metacyclops* in central and northern part of the Dinaric Alps: *M. trisetosus* (Herbst, 1957), *M. postojnae* Brancelj, 1987, and *M. gasparoi* Stoch, 1987. In Italy the most important obstacle probably is the distribution of main karstic areas (see Pesce 1985: fig. 1).

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Tanytarsus minutipalpus, spec. nov. from the saline lakes in the Rift Valley, East Africa

(Insecta, Diptera, Chironomidae)

Torbjørn Ekrem & Arthur D. Harrison

Ekrem, T. & A. D. Harrison (1999): *Tanytarsus minutipalpus*, spec. nov. from the saline lakes in the Rift Valley, East Africa (Insecta, Diptera, Chironomidae). – Spixiana **22/3:** 199-208

Tanytarsus minutipalpus, spec. nov., from the saline lakes in the Rift Valley in East Africa is described and figured in all stages. The males and pupae fit well in the *Tanytarsus mendax* species group if the lack of digitus is ignored, and the larva show some characteristics that could be diagnostic for this group. The immatures of *T. minutipalpus* were collected in lakes with a conductivity of 19,000 to at least 40,000 µS/cm. The adults often occur in mass numbers around the saline Rift Valley lakes, and can have a potential of becoming a nuisance problem.

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Arthur D. Harrison, 111A Berg Road, Fish Hoek, 7975, South Africa.

Introduction

Tanytarsus v. d. Wulp, 1874 is one of the most species-rich genera of the family Chironomidae, with at least 85 species described from the Holarctic region (Cranston et al. 1989). Reiss and Fittkau (1971) placed the European *Tanytarsus* species into species-groups based solely on adult male characters. Their suggestions were adopted by Cranston et al. (1989) in the key to the adult males of Holarctic Chironominae, but the *holochlorus*-group was renamed the *mendax*-group as *Tanytarsus holochlorus* sensu Reiss and Fittkau proved to be a synonym of *T. mendax* Kieffer. Sasa and Kikuchi (1995) erected species-groups for the Japanese, and Glover (1973) for the Australian *Tanytarsus* species. Neither Sasa and Kikuchi nor Glover adopted the ideas of Reiss and Fittkau (1971), and their species groups do not correspond to the groups suggested for the European *Tanytarsus* species. Describing six new species from Ghana, West Africa, Ekrem (1999) found it difficult to place African *Tanytarsus* species in the European species groups. The new species described here, however, possesses most of the diagnostic characters of the *mendax*- group.

Material and methods

The terminology follows Sæther (1980) with the additions and corrections given by Sæther (1990). The term "shoulders" is used for the posteriomarginal lobes of the male anal tergite. The term "LS" (Pinder & Reiss 1986) is used for the lateral lamelliform setae of the pupal abdomen. The mounting procedure is according to Sæther (1969). Measurements are taken according to Schlee (1966) with the additions given by Ekrem (1999).

The different stages were associated by rearing in the strongly saline water of the small Lake Chitu, Ethiopia.

Tanytarsus minutipalpus, spec. nov.

Tanytarsus sp. (Milbrink 1977).
Tanytarsus horni Goetghebuer sensu Vareschi & Jacobs (1984), Vareschi & Vareschi (1984), Harrison (1987), Tudorancea & Harrison (1988), Tudorancea et al. (1989).
Tanytarsus sp. A (Verschuren 1997).

Types. Holotype: 1♂, Tanzania, Lake Manyara at Hotel, 30.I.1987, leg. E. G. Burmeister. – Paratypes: 2♂♂, 8♀♀, as holotype; 3♂♂, Kenya, Bogoria, S Lake Baringo, 6.III.1983, leg. E. J. Fittkau; 4♂♂, 2♀♀, 6 pupal exuviae. 1 larva, Ethiopia, Lake Chitu, III.1983, leg. A. D. Harrison; 1♂, Kenya, Lake Bogoria, 1.IX.1985, leg. A. D. Harrison; 1♂, Kenya, Lake Elmenteita, 31.VIII.1985, leg. A. D. Harrison; 1♂, Kenya, Lake Nakuru, light trap by hotel, 2.IX.1985, leg. A. D. Harrison; 1 pharate pupa (♀), Ethiopia, Lake Shala, north shore, 17.I.1985, leg. A. D. Harrison; 4 larvae, Ethiopia, Lake Shala, north-east shore, Ekman grab at 15 m, 17.I.1985, leg. A. D. Harrison.

1♂ and 1♀ paratype deposited at Museum of Zoology, University of Bergen, Bergen, Norway (ZMBN). All other types and additional alcohol material from the type localities at Zoologische Staatssammlung München (ZSM), Munich, Germany.

Diagnostic characters. The new species differs from other *Tanytarsus* species by the following combination of characters: male with wing almost bare, carrying only a few setae on apical ⅕; maxillary palps with 5 extremely short palpomeres (Fig. 1B); hypopygium: median setae on anal tergite absent; anal point with spines between well developed anal crests; superior volsella well developed with dorsolateral microtrichiae, digitus missing; median volsella with numerous lamellae. The maxillary palp with only 4 extraordinary short palpomeres (Fig. 2B) separates the female from other described *Tanytarsus* females. Pupa with long, slender and bare thoracic horn; long cephalic tubercles with almost equally long frontal setae; pedicel sheath tubercle well developed; hook row almost as wide as tergite II; spinepatch of tergite III on posterior part of tergite, with long spines directed posteriorly; spine patches on tergites IV and V elongate, spine patch on T VI circular; LS setae on segment VIII only. Larva with pedicel of Lauterborn organs about as long as antennal segment three; well sclerotisized premento-hypopharyngeal complex; SII, chaetae, chaetulae and spinulae all simple; premandible with six teeth, the outermost stiliform; dorsal teeth of the mandible well developed with basal most tooth extending beyond ventral, inner teeth; spine on mola present.

Description

Male imago (n = 6).

Total length 4.0-4.7 mm. Wing length 1.91-2.07 mm. Total length/wing length 2.03-2.25.

Coloration. Cleared specimens with head light brown, darker brown pedicel, apodemes and eyes; thorax (Fig. 1C) with dark brown patches anteriorly on scutum, laterally under parapsidal suture, on median anepisternum II, on epimeron II, basally on scutellum, basally on post- and antepronotum and on preepisternum; legs light brown; abdominal tergites II-VI with posterior, transverse, dark band and longitudinal median band, tergite VI with an additional anterior transverse band. Tergite VII with a broad transverse anterior stripe, tergite VIII usually with 2 large medially connected pigment patches. Colour intensity fading towards apex of abdomen.

Head (Fig. 1B). Antennae normally developed with AR 1.35-1.58. Thirteenth flagellomere 612-670 μm long. Longest antennal seta about 600 μm long. Distance between eyes 227-270 μm. Large cephalic tubercles, about 40-57 μm long with laced apexes. Temporal bristles 15-17; including 4-5 inner verticals, 4-6 outer verticals and 6-7 postorbitals. Clypeus semicircular, 61-83 μm long with 16-29 setae. Tentorium 154-166 μm long, 36-54 μm wide at sieve plate. Stipes 97-140 μm long, 14-22 μm wide. Cibarial pump with one pair of 2-3 ventrolateral sensorial setae, cibarial pump 61-68 μm wide. Lengths of palp segments (in μm): 18-25, 22-29, 29-47, 40-50, 68-79.

Thorax (Fig. 1C). Dorsocentrals 10-14, acrostichals 15-22, prealars 1-2, scutellars 7-12. Halteres with 5-7 setae.

Wing (Fig. 1A). VR 1.04-1.10. Brachiolum with 1 seta, Sc bare, R with 7-18 setae, R_1 with 0-4, R_{4+5} with 1-3, M_{1+2} with 8-21 setae. Rest of veins bare. Cell m bare, r_{4+5} with 40-58 setae, m_{1+2} with 3-11 setae including on false vein, m_{3+4}, cu and an all bare.

Legs. Spur on front tibia 46-50 μm long including scale. Spurs of middle tibia 32-36 μm long including 14-18 μm long comb and 29-32 μm long including 14-18 μm long comb; of hind tibia 38-47 μm long including 14-18 μm long comb and 36-40 μm long including 14-18 μm long comb. Middle tibiae with 6-15 sensilla chaeticae.

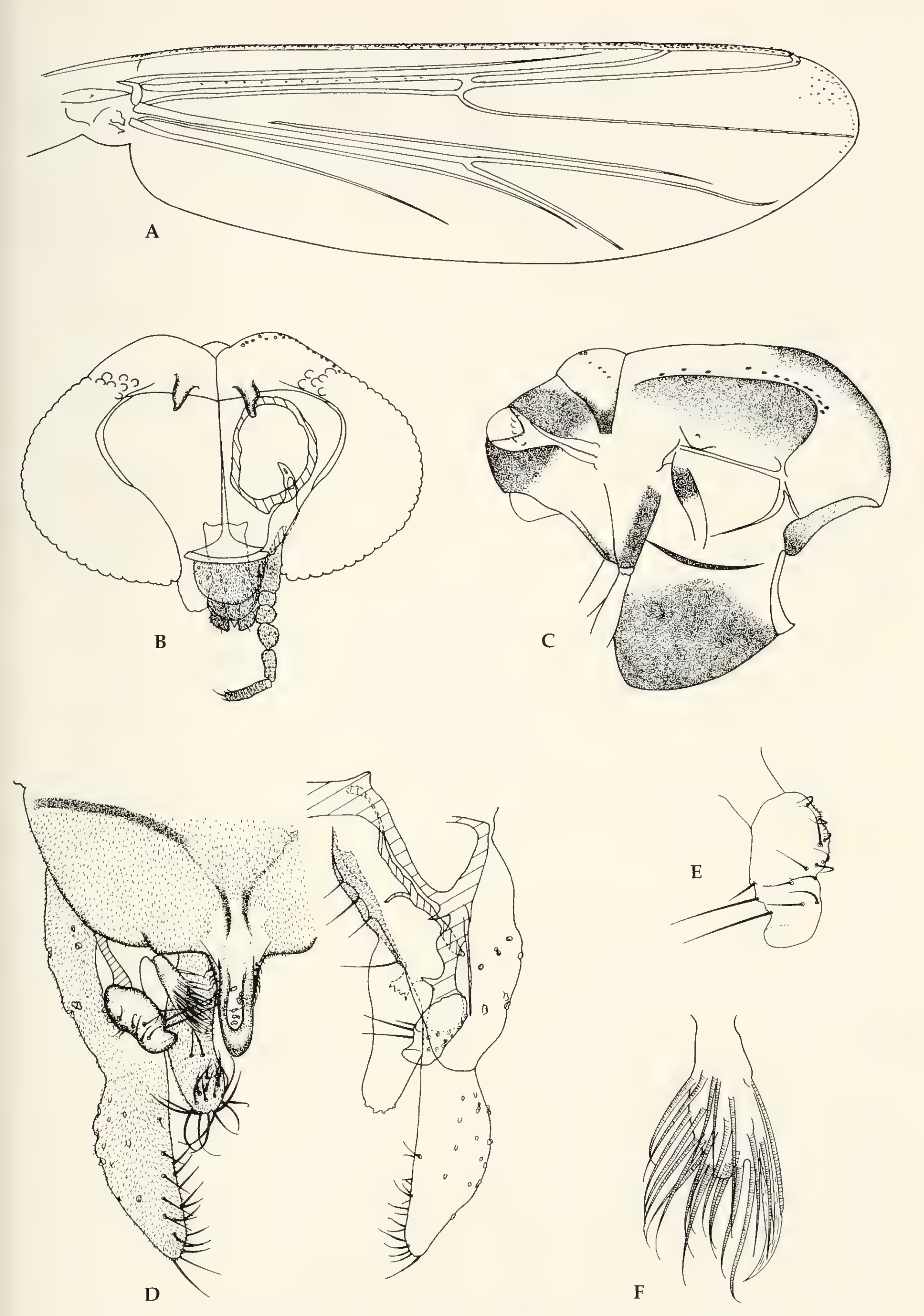


Fig. 1. *Tanytarsus minutipalpus,* spec. nov. ♂. **A.** Wing. **B.** Head. **C.** Thorax. **D.** Hypopygium, dorsal and ventral view. **E.** Superior volsella. **F.** Median volsella.

Lengths (in μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	648-731	486- 536	922-1058	479-514	382-425	270-288	133-162
p_2	745-806	724- 788	371- 439	227-252	187-212	133-151	101-108
p_3	774-857	961-1015	594- 673	360-396	338-356	198-205	122-158
	LR	BV	SV	BR			
p_1	1.90-2.05	1.60-1.81	1.16-1.27	3.3-4.9			
p_2	0.51-0.57	2.76-2.91	3.50-3.73	4.9-6.0			
p_3	0.62-0.68	2.25-2.36	2.75-2.92	4.3-5.7			

Hypopygium (Fig. 1D). Tergite IX 136-152 μm long, median setae lacking, but 14-18 apical setae are present; apical margin with shoulders; lateral teeth not visible; microtrichiae absent in an area around base of anal point. Anal point 61-86 μm long, 23-32 μm wide at base and 9-11 μm wide at apex. Anal point with 4-6 spines between well developed anal crests. Broad anal tergite bands curved anally, almost reaching anal point, with median elongations almost connecting the tergite bands. Transverse sternapodeme 57-89 μm long, phallapodeme 125-149 μm long. Gonocoxite 182-124 μm long, gonostylus 154-182 μm long. Superior volsella tapered towards a median elongated apex; bearing 5-6 small dorsal setae; 4-5 small lateral setae and 3 median setae, the apical 2 much stronger than the basal one; dorsolateral microtrichiae present (Figs 1D, E); digitus absent. Median volsella (Fig. 1F) 36-50 μm long with 4-6, 25-32 μm long, subulate lamellae. Inferior volsella relatively straight, 143-121 μm long, with strong apical setae directed both orally and anally. HR 1.09-1.21, HV 2.28-2.84.

Female imago (n = 8).

Total length 3.28-3.64 mm. Wing length 1.91-2.02 mm. Total length/wing length 1.69-1.87.

Coloration. Similar to male, but with smaller patches on the abdominal tergites.

Head. Antennae (Fig. 2A) with 4 flagellomeres; pedicel 50-72 μm long; lengths of flagellomeres (in μm): 97-115, 61-65, 61-72, 162-191. AR 0.68-0.77. Flagellomeres 1-3 with 1 antennal spur, flagellomere 4 with numerous spurs. Distance between eyes 216-252 μm. Cephalic tubercles pyramid shaped, 32-54 μm long. Temporal bristles 12-14; including 3-4 inner verticals, 3-5 outer verticals and 4-6 postorbitals. Clypeus semicircular, 68-101 μm long, with 34-51 setae. Tentorium 130-144 μm long, 29-36 μm wide at sieve plate. Stipes about 104-115 μm long, 14 μm wide. Cibarial pump 58-79 μm wide, with one pair of 4-5 ventrolateral sensorial setae. Maxillary palp (Fig. 2B) with 4 palpomeres; lengths (in μm): 18-25, 22-25, 40-42, 54-76.

Thorax. Dorsocentrals 11-16, humerals 2-6, acrostichals 16-27, prealars 1-2, scutellars 7-11. Halteres with 6-10 setae.

Wing. VR 1.06-1.13. Brachiolum with 1 seta, Sc bare, R with 16-26 setae, R_1 with 15-24, R_{4+5} with 16-22, M_{1+2} with 20-35, M_{3+4} with 9-27, Cu with 0-21, Cu_1 with 3-13, PCu with 0-6 setae, An bare. Cell m bare, r_{4+5} with about 80-190 setae, m_{1+2} with 80-190 including on false vein, m_{3+4} with 3-42, cu with 0-3 setae, an bare.

Legs. Spur on front tibia 36-47 μm long including scale. Spurs of middle tibia 27-32 μm long including 11-18 μm long comb and 18-32 μm long including 11-18 μm long comb; of hind tibia 25-36 μm long including 14-18 μm long comb and 25-32 μm long including 11-18 μm long comb. Middle tibiae with 30-44 sensilla chaeticae.

Lengths (in μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	558-623	461-486	799-835	324-342	241-256	162-198	97-119
p_2	688-760	709-738	353-385	187-205	144-166	162-198	79- 97
p_3	745-788	950-983	547-565	281-313	263-306	144-169	108-115
	LR	BV	SV	BR			
p_1	1.67-1.77	2.09-2.24	1.27-1.38	2.1-2.4 (n=4)			
p_2	0.49-0.54	3.09-3.42	3.66-4.13	1.6-2.8 (n=5)			
p_3	0.55-0.58	2.58-2.81	3.01-3.21	1.9-2.3 (n=4)			

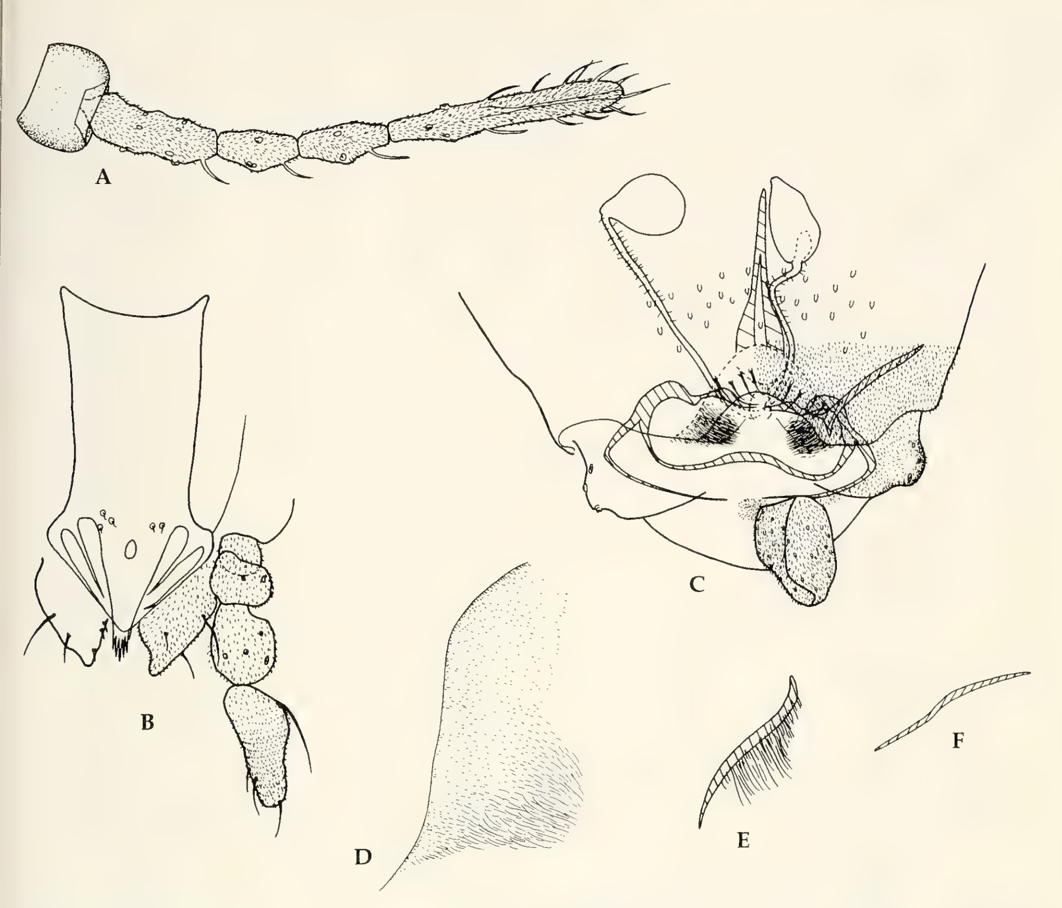


Fig. 2. *Tanytarsus minutipalpus*, spec. nov. ♀. **A.** Antenna. **B.** Cibarial pump and maxillary organs. **C.** Genitalia, ventral view. **D.** Ventrolateral lobe of gonapophysis VIII. **E.** Dorsomedian lobe of gonapophysis VIII. **F.** Apodeme lobe of gonapophysis IX.

Genitalia (Figs 2C-F). Tergite IX apically rounded; floor under vagina well developed, bearing 3-7 lateral setae; seminal capsules 65-83 μm long, with lateral neck; notum 58-72 μm long, notum + rami 115-158 μm long; gonocoxite apodemes somewhat concave with forked posterior apex. Lobe of gonapophysis VIII (Fig. 2D) with long, straight, medioposteriorly directed microtrichiae; dorsomesal lobe of gonapophysis VIII (Fig. 2E) slightly S-shaped with long median microtrichiae; apodeme lobe of gonapophysis IX (Fig. 2F) straight; coxosternapodeme with 1 small and 1 large anteriorly directed lobe; gonocoxite IX laterally extruding with about 3-7 setae; postgenital plate circular; cerci 86-101 μm long.

Pupa (n = 6).

Total length 3.7-4.6 mm. Coloration light brown [The exuviae were transparent, almost glassy before mounting, and therefore difficult to handle. Only the below described features were visible in a Leica Diaplan light microscope with phase contrast].

Cephalothorax (Figs 3A,B). Length of frontal setae 76-94 μm, cephalic tubercles large, conical (Fig. 3Â), 79-108 μm long. Pedicel sheath tubercle (Fig. 3B) prominent, approximately. 18-25 μm long. Thoracic horn (Fig. 3B) bare, evenly tapered, 580-850 μm long, 29-36 μm wide. Three equally long precorneals, 76-108 μm, placed in a row; antepronotals 2: 1 small, dorsal 36-47 μm long, 1 large, ventral 90-94 μm long; 2 pairs of dorsocentrals with 1 thin and 1 thick seta in each pair, thin setae about 60 μm long, thick setae about 75 μm long.

Abdomen (Figs 3C,D). Anterior, transverse band and two triangular posterior patches of shagreen on tergite (T) II; pedes spurii A and B absent; hook row 234-425 μm long, almost the width of TII; spines



Fig. 3. *Tanytarsus minutipalpus*, spec. nov. Pupa. **A.** Frontal apotome. **B.** Thoracic horn. **C.** Spines of abdominal tergites. **D.** Posterolateral comb of segment VIII.

of T III 40-65 μm long, in separate, laterally curved longitudinal rows on posterior half of tergite; spines of T IV 14-50 μm long with short spines in separate, elongate patches, often with long spines placed posteriorly of these patches (Fig. 3C); spines of T V 11-14 μm long in small, anterior, oval patches; spines of T VI 7-11 μm long in small, anterior, circular patches; segments V-VII with normal, 36-54 μm long L setae, segment VIII with 5 about 160 μm long LS setae of which the third seta is placed more medially than the other four; anal lobe with 2 dorsal lamelliform setae, anal fringe with 41-50, 259-270 μm long lamelliform setae; posterior lateral comb of segment VIII (Fig. 3D) 58-79 μm wide with 7-9 apical teeth.

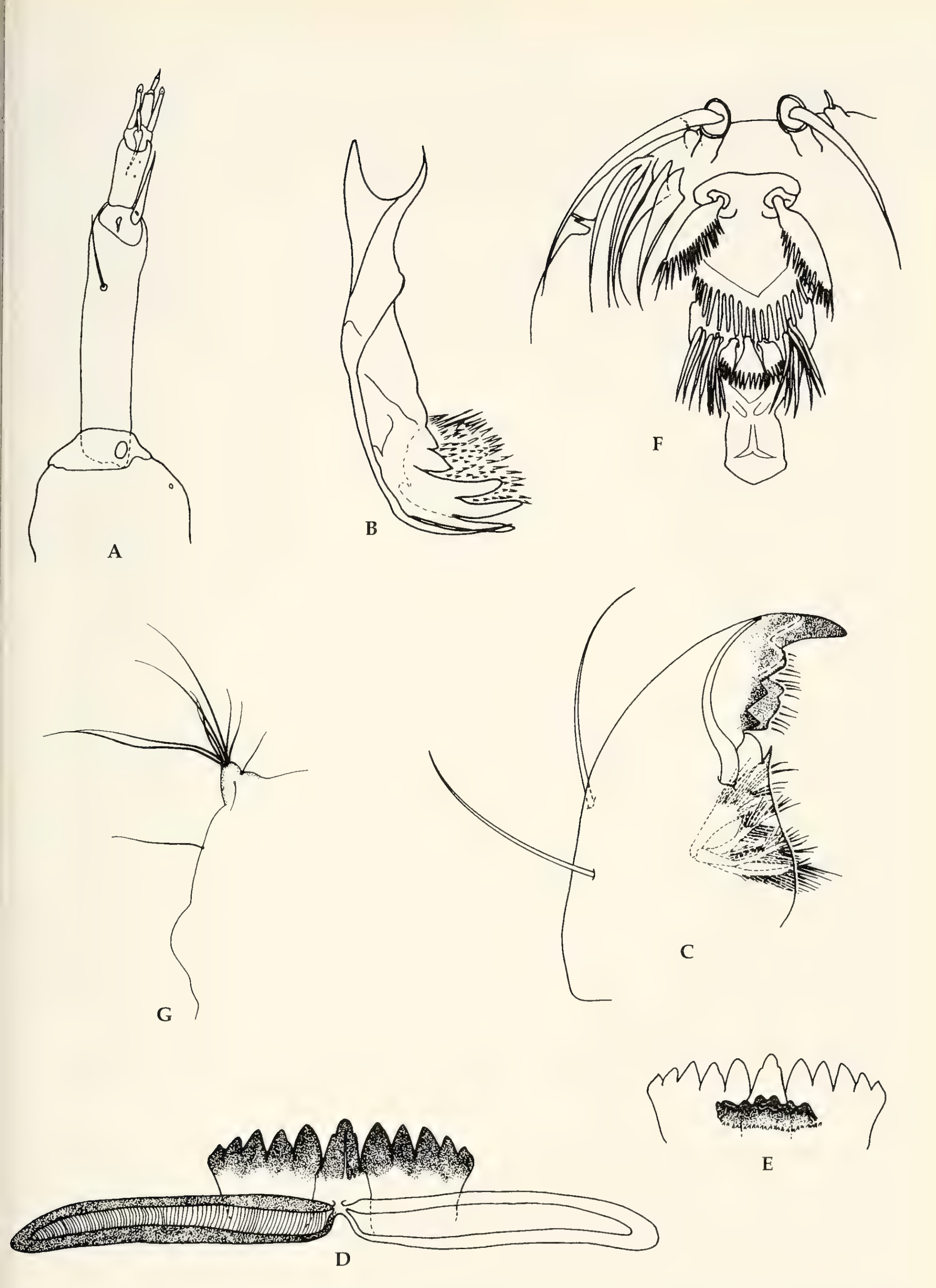


Fig. 4. *Tanytarsus minutipalpus*, spec. nov. Larva. **A.** Antenna. **B.** Premandible. **C.** Mandible. **D.** Mentum with ventromental plates. **E.** Mentum with premento-hypopharyngeal complex. **F.** Labral region. **G.** Anal region.

Larva (n = 5).

Total length 4.9-6.7 mm. Length of head capsule 353-378 µm.

Head. Antenna (Fig. 4A) with five segments. Length of segments (in µm) 95-107, 25-32, 11-18, 7-8, 5-6. AR 1.62-1.90. Antennal pedestal 34-39 µm long; basal antennal segment 20 µm wide; distance from base of basal antennal segment to ring organ 2-3 µm; distance from base to antennal seta 68-75 µm; blade 20-34 µm long; accessory blade 16-23 µm long. Apical style of second antennal segment 5-7 µm long. Lauterborn organs 18-25 µm long, barely longer than third antennal segment. Premandible (Fig. 4B) 66-68 µm long, with six teeth, the outermost being stiliform, other teeth more or less spatulate; premandible brush well developed. Mandible (Fig. 4C) 134-159 µm long with 3 ventral inner teeth, and 2 dorsal inner teeth, basal most being large and rectangular; dorsal apical tooth present, about half length of ventral apical tooth; two outer mandibular setae present; seta subdentalis thick, about 36 µm long and curved; mola with one spine; seta interna well developed. Mentum (Figs 4D,E) 91-102 µm wide with 11 teeth; median tooth with lateral notches; ventromental plates, 123-134 µm wide; premento-hypopharyngeal complex well sclerotisized, consisting of 3 toothed lamellae (Fig. 4E). Labrum (Fig. 4F) with S I plumose, 20-27 µm long; S III simple, 40-57 µm long on 14-20 µm long pedestal; S IVA and B simple; spinulae and chaetae simple; chaetulae basales foliate, chaetulae laterales falciform; labral lamella comblike with broad teeth; pecten epipharyngis consisting of 3 plumose scales; ungula and basal sclerite both well developed. Maxilla two segmented, about 10 µm long.

Body. Anterior and posterior parapods with simple claws; posterolateral setae on segments IV-VIII, transparent; procercus (Fig. 4G) 27-40 µm long, 23-34 µm wide; 8 anal setae 114-272 µm long; procercus with one dorsal and one lateral seta in addition to anal setae; 2 anal tubules, about 40 µm long; one strong seta between procercus and anal tubules.

Discussion

Based on the adult male morphology, *Tanytarsus minutipalpus*, spec. nov. keys either to the *T. mendax*- or the *T. lugens*-species group (Cranston et al. 1989). The shape of the anal point, median volsella and superior volsella of the male is very similar to *T. horni* in the *T. mendax*-group, but *T. minutipalpus* lacks the digitus, a feature diagnostic for the *T. lugens*-group (compare Reiss & Fittkau 1971, figs 33-42). In Pinder and Reiss (1986) the pupa keys out to the *T. mendax*-group mainly because of its large cephalic tubercles. No diagnostic characters are present for larvae of the *T. mendax*-group, but according to Hofmann (1971) a mandible with two dorsal teeth and an additional tooth on the dorsal surface is characteristic for larvae of the *T. lugens*-group. Thus, the larva of *T. minutipalpus* in this respect shows affinity with the *T. lugens*-group. Dejoux (1968) described the larva of *T. nigrocinctus* Freeman, which was synonymised with *T. horni* by Reiss and Fittkau (1971), and Verschuren (1997) included photographs of this species in his work on subfossil chironomids from Kenya. Comparing the photos and drawings of *T. minutipalpus* with those of *T. horni* reveals similarities such as short Lauterborn organs and only simple spinulae and chaetae on labrum. These larval characters could be diagnostic for the *T. mendax*-group, but a revision of the two species groups is necessary to determine this with certainty. We tentatively choose to place the new species in the *T. mendax* species group.

T. minutipalpus, spec. nov. is a halobiont species, specially adapted to the extreme conditions in the soda lakes of the Rift Valley (Tab. 1). In some of these metasaline lakes like Elmenteita, Bogoria and Chitu, it is probably the only chironomid species present (Verschuren 1997).

Tab. 1. Lakes inhabited by *T. minutipalpus*, spec. nov.

Country	Lake	Conductivity (µS/cm)	Reference
Ethiopia	Chitu	40,000	Verschuren (1997)
Ethiopia	Shala	21,000	Tudorancea & Harrison (1988)
Kenya	Elmenteita	≥38,000	Verschuren (1997)
Kenya	Baringo	≤ 1,200	Källquist (1987)
Kenya	Bogoria	≥35,700	Verschuren (1997)
Kenya	Nakuru	≥19,000	Verschuren (1997)
Tanzania	Manyara	94,000	Talling & Talling (1965)

In addition to the records presented in Tab. 1, the species is found as a subfossil in the lakes Sonachi and Oloidien in Kenya. Apparently, *T. minutipalpus* dominated the chironomid community of Lake Sonachi from the late 1940s to the mid- 1960s and Lake Oloidien in the 1870s and early 1880s (Verschuren 1997). The specimens collected at Lake Manyara were caught in 1987, more than 20 years after the analyses done by Talling & Talling (1965) for water conductivity. Since large water level and salinity fluctuations seems to be common in many of the lakes in the Rift Valley, it is probable that the conductivity was lower than 94,000 μS/cm when the specimens were collected. Nevertheless, it is possible that *T. minutipalpus* handles water with a conductivity of more than 40,000 μS/cm as recorded by Verschuren (1997) for Lake Chitu. Adults of the new species were collected close to the non-saline Lake Baringo ($\leq$ 1,200 μS/cm) in 1983. According to Verschuren (1997, pers. comm.) it is not likely that the immature stages live in water with conductivity much below 19,000 μS/cm. Around Lake Baringo there are several saline springs (Källquist 1987), and it could well be that the immatures of the adults caught at Lake Baringo live in saline pools close to the lake, and not in the lake itself.

T. minutipalpus is known to have mass occurrences at Lake Bogoria, Lake Elmenteita and Lake Manyara, and is a potential nuisance species.

Acknowledgements

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Catalogue of the type-specimens of the Sphingidae stored at the Zoologische Staatssammlung München (ZSM)

(Insecta, Lepidoptera)

Michael A. Miller and **Axel Hausmann**

Miller, M. A. & A. Hausmann (1999): Catalogue of the type-specimens of the Sphingidae stored at the Zoologische Staatssammlung München (ZSM) (Insecta, Lepidoptera). – Spixiana **22/3:** 209-243

This type list gives a survey on all the type specimens of the family Sphingidae (Lepidoptera, Insecta) stored at the Zoologische Staatssammlung München, Germany (ZSM). It contains 79 name bearing types of available taxa, and 65 so called name bearing types of unavailable (infrasubspecific) taxa. The actual systematic position is added. 54 Taxa are represented by paratypes only. In the ZSM 198 Sphingidae-taxa are represented by any type material. These are listed in a synopsis with the corresponding box numbers of coll. ZSM. There is a total of 417 type-specimens (paratype series included). All the label data are available and accessable in the ZSM in data base format (MS Access).

Michael A. Miller, Axel Hausmann, Zoologische Staatssammlung München, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

The presented work is aimed to provide a survey over all the specimens of Sphingidae stored at the Zoologische Staatssammlung München (ZSM) which are labeled as "type specimens". The main purpose is to give a working basis for taxonomists. Therefore no comment is given, when the taxonomical status of some of the types is unclear. It has to be cleared up in future.

The nomenclature follows mainly the "Catalogue of the Family-Group, Genus-Group and Species-Group Names of the Sphingidae of the World" by Charles A. Bridges. The citation of the species in D´Abreras "Sphingidae mundi" and "Die Schwärmer der westlichen Paläarktis" by Danner, Eitschberger & Surholt is given if there is any. For neotropical taxa the "Atlas of Neotropical Lepidoptera, Checklist: Part 4B, Drepanioidea – Bombycoidea – Sphingoidea" edited by J. P. Heppner is cited. Most recent changes in nomenclature and systematics are sometimes taken into consideration but are not exhaustive.

The following list consists of four parts:

I. Name-bearing types of available taxa, i.e. holotypes, lectotypes, and potentially name-bearing types from syntype-series: The original reference, literal label data, actual name and status.

II. Name-bearing "types" (original specimens) of nomenclaturally unavailable taxa: Original reference, labels data, systematic comments.

III. List of taxa, which are represented in the ZSM just by paratypes (with actual name and status).

IV. Synopsis: Alphabetical list of all the taxa represented at the ZSM by any type material: With original name and box number.

Abbreviations

OD: Original description
GP: Preparation of genitalia
ZSM: Zoologische Staatssammlung München (Germany)

Handwriting on labels is written in *italics*, printings in usual letters. Single lines separated by /, whole labels by //.

I. Name bearing types of available taxa

acra Gehlen, 1935

Temnora reutlingeri ssp. *acra* Gehlen, 1935: Ent. Z. 49 (2): 11, f. 2 & 3.

Syntype: White card: "Manow / D O. Afr." [Tansania] // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Temnora/reutlingeri acra* / *♂-Type Gehlen*", rear: "*Manow* / *East-Africa*", right side downwards: "*1934*" // red card with black margin: "Holotypus / *Temnora/reutlingeri* / *ssp. acra Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *55* / *TEMNORA* / *GRISEATA R&J*." [box 509], [GP on specimen].

Actual status: Subspecies of *Temnora reutlingeri* (Holland, 1889) (Bridges 1993).

aguacana Gehlen, 1944

Sesia titan ssp. *aguacana* Gehlen, 1944: Ent. Z. 57 (21): 166.

"Type": White card: "Rio Aguacatal / Colomb. West. Cord. / 2000m / Coll. Fassl." // White card with red margin: "*Sesia titan aguacana* / *Gehlen* / *♂-Type Gehlen*" // red card with black margin: "Holotypus / *Sesia titan* / *f. aguacana Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 407].

Actual status: Subspecies of *Aellopos titan* (Cramer, [1777]) (Bridges 1993; Carcasson & Heppner 1996).

albina Gehlen, 1941

Pseudosphinx tetrio ssp. *albina* Gehlen, 1941: Ent. Z. 55 (24): 186.

Syntype: White card, left side upright: "Staatssamml. / München"; level: "*Cuba* / *Habana*" // yellow card with black margin, left side upright: "Coll. Gehlen"; level: "*Pseudosphinx* / *tetrio albina* / *♂-Type Gehlen*" // red card with black margin: "Holotypus / *Pseudosph. tetrio* / *ssp. albina Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 315].

Actual status: Subspecies of *Pseudosphinx tetrio* (Linnaeus, 1771) (Bridges 1993). Carcasson & Heppner 1996 retain this taxon synonym of *tetrio*.

alegrensis Closs, 1915

Xylophanes alegrensis Closs, 1915: Ent. Mitt. 4 (10/12): 291.

Holotype: [♂] White card with red margin: "*Porto alegre* / coll. A. Closs" // white card: "*Süd Brasilien* / *Porto Alegre* / Zoologische / Staatssammlung / München" // grey card with red margin: "*alegrensis* / *Closs*" // red card with black margin: "Holotypus / *Xylophanes* / *alegrensis Closs* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 549], [GP on specimen].

Actual status: Species of *Xylophanes* Hübner, 1819 (D'Abrera 1986; Carcasson & Heppner 1996; Bridges 1993). The holotype of the OD is female, the type in the ZSM is male, with an added GP.

argentinica Daniel, 1949

Protoparce florestan ssp. (f. oec.) *argentinica* Daniel, 1949: Mitt. Münch. Ent. Ges. 35-39: 230, pl. 2, fig. 2.

Holotype: [♂] White card: "Tucuman / Argentinien / Schreiter. leg. / F. Nosswitz I. 28" // red card with black margin: "Holotypus / *Protop. florestan* / *ssp. argentinica* / *Daniel* / Zool. Staatssammlung München" [box 108].

Actual status: Subspecies of *Manduca florestan* (Stoll, [1782]) (Bridges 1993). Carcasson & Heppner 1996 mention it as synonym of *florestan*.

bilineata Gehlen, 1928

Xylophanes rothschildi ssp. *bilineata* Gehlen, 1928: Int. Ent. Z. 21 (42): 394.

"Type" ?: [♂] White card: "*Peru / Marcapata / Madre de Dios / 71° w.L. 13,5° s.Br.* / Zoologische / Staatssammlung / München" // red card: "Typus" // red card with black margin: "Holotypus / *Xyloph. rothschildi / f. bilineata Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 549].

Actual status: Subspecies of *Xylophanes rothschildi* (Dognin, 1895) (Bridges 1993). Carcasson & Heppner 1996 call this taxon "*binineata*" (incorrect subsequent spelling) and regard it as a synonym of *rothschildi*. It is not clear that this specimen is type material. The type locality of the original description (Chanchamayo, Peru) does not correspond to the label of the specimen of ZSM.

borneensis Gehlen, 1940

Oxyambulyx tattina ssp. *borneensis* Gehlen, 1940: Ent. Z. 54 (18): 140.

Holotype: [♂] White card: "Borneo" // white card, left side upright: "Zoolog. Staats- / sammlung München", level: "*Süd-Borneo / Samarinda / 9.XI.39*" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Oxyambulyx / tattina borne= / ensis. Type. Gehlen / S. O. Borneo*", right side downwards: "*1940*" // red card with black margin: "Holotypus / *Oxyambulyx / tattina bornaensis / Gehlen* / Zool. Staatssammlung München" // white card with black margin: " K. Kernbach det. *1966 / Oxyambulyx tattina J.*" // white card: "Sammlung / Gehlen" [box 178], [GP on specimen].

Actual status: Subspecies of *Ambulyx tattina* (Jordan, 1919) (Bridges 1993).

bossardi Gehlen, 1926

Protoparce bossardi Gehlen, 1926: Int Ent. Z. 20 (21): 173.

Holotype: White card: "*Mexico / St. Cruz* / Zoologische / Staatssammlung / München" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Protoparce / bossardi ♂ m / Gehlen.*" // red card with black margin: "Typus ~~Nr~~. / *Protop. lefeburei / ssp. bossardi / Gehlen* / Zoologische / Staatssammlung / München" / / white card: "Sammlung / Gehlen"[box 085], [GP on specimen].

Actual status: Species of *Manduca* Hübner, [1807] (Bridges 1993) or synonym of *Manduca lefeburei* (Guérin-Méneville, 1844) (Carcasson & Heppner 1996), respectively.

The spelling "*bossarai*" (as used in Bridges 1993) is an incorrect original spelling according to art. 32c (ii) ICZN (1985). Gehlen devotes this species explicitly to a person named "Bossard". Therefore "*bossarai*" is a printer's error (the second "a" is furthermore printed in an unusual way) and has to be corrected to "*bossardi*" in accordance with art. 32d (justified emendation according to art. 33b (ii)).

cana Gehlen, 1940

Oxyambulyx substrigilis ssp. *cana* Gehlen, 1940: Ent. Z. 54 (18): 140, f. 3.

Holotype: [♂] White card: "Borneo" // white card: "Samarinda, / Süd-Borneo / 9.-11.39" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Oxyambulyx / substrigilis / cana Type Gehlen / S. O. Borneo*" // red card with black margin. "Holotypus / *Oxyamb. substrigilis / cana Gehlen* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. 1966 / *Oxyambulyx / substrigilis / brooksi Cl.*" / / white card: "Sammlung / Gehlen" [box 175], [GP on specimen].

Actual status: Subspecies of *Ambulyx substrigilis* (Westwood, 1847) (Bridges 1993).

castanella Gehlen, 1942

Theretra castanella Gehlen, 1942: Veröff. dt. Kolon.- u. Übersee-Mus. 3: 286.

Syntype: White card with black margin: "Bombay / H. Hartmann" // white card with red margin, left side upright: "Coll. Gehlen", level: "*Theretra 1942 / castanella / ♂ – Gehlen / Type*" // red card with black margin: "Holotypus / *Theretra / castanella Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 666], [GP on specimen].

Actual status: Species of *Theretra* Hübner, [1819] (D'Abrera 1986; Bridges 1993).

celebensis Jordan, 1919

Oxyambulyx semifervens ssp. *celebensis* Jordan, 1919: Novit. zool. 26: 192, f. 3.

"Pseudotype": White card: "Tondano / Celebes" // white card with red margin, written over two unseparated labels, left side upright: "Coll. Gehlen Coll. Gehlen", level: "*Oxyambulyx / semifervens / celebensis R. & J. / ♀ – Type Gehlen / 1928*" // red card with black margin: "Holotypus / *Oxyamb. semifervens / celebensis R. & J.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 181].

Actual status: Subspecies of *Oxyambulyx semifervens* (Walker, [1865]) (mentioned in D'Abrera 1986 as not known to him with Austaut as author of the OD with a question mark, while Bridges 1993 gives the correct original citation).

Rothschild (1919) mentions the holotype of *O. semifervens celebensis* as number 101 in his " List of types of Lepidoptera in the Tring Museum, I. Sphingidae". That means that the type identity of the specimen of the ZSM, which is labeled as Type by Gehlen himself is erroneous.

centrosplendens Gehlen, 1940

Protoparce centrosplendens Gehlen, 1940: Ent. Z. 54 (18): 139, f. 1.

"Type": [♀] White card: "Peru" // White card: "*Peru / Satipo* / Zoologische / Staatssammlung / München" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Protoparce / centrosplendens / Type Gehlen / Satipo, Peru*", right side downwards: "*1940*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. centrosplendens / Gehlen* / Zoologische / Staatssammlung / München" [box 095], [GP on specimen].

Actual status: Synonym of *Manduca brunalba* (Clark, 1929) (Bridges 1993; Carcasson & Heppner 1996).

ceylonica Kernbach, 1960

Marumba dyras ssp. *ceylonica* Kernbach, 1960: Deut. Ent. Z., N.F. 7 (1/2): 190.

Holotype: [♂] White card with black margin: "*Kandy* / (*Ceylon*) [Sri Lanka] / coll. A. Closs" // red card: "Typus" // red card with black margin: "Holotypus / *Marumba dryas / ceylonica Kb.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *1959 / Marumba / dyras ceylonica*" [box 221], [GP on specimen].

Actual status: Subspecies of *Marumba dyras* (Walker, 1856) (not mentioned in Bridges 1993).

chinchilla Gehlen, 1942

Protoparce chinchilla Gehlen, 1942: Ent. Z. 56 (16): 127.

Syntypes: 1 ♂: White card: "*Peru / Charcani / bei Arequipa / 2500m* / Zoologische / Staatssammlung / München" // blue card with red margin, left side upright. "Coll. Gehlen", level: "*Protoparce / chinchilla / ♂ – Type Gehlen*" // red card with black margin: "♂ Typus ~~Nr.~~ / *Pr. chinchilla Gehlen* / Zoologische / Staatssammlung / München" // white card: "Sammlung / Gehlen" [box 095] [GP on specimen]
1 ♀: White card: "*Febr. 27*" // blue card with red margin, left side upright. "Coll. Gehlen", level: "*Protoparce / chinchilla / ♀ – Type Gehlen*" // red card with black margin: "♀ Typus ~~Nr.~~ / *Pr. chinchilla Gehlen* / Zoologische / Staatssammlung / München" // white card: "Sammlung / Gehlen" [box 095].

Actual status: Species of *Manduca* Hübner, [1807] (D'Abrera 1986; Bridges 1993; Carcasson & Heppner 1996).

coreana Gehlen, 1941

Callambulyx tatarinovi ssp. *coreana* Gehlen, 1941: Ent. Z. 55 (23): 178.

Syntype: White card with black margin: "Saishin / Nord-Korea" // yellow card with red margin: "*Callambulx tatarinovi / ssp. coreana / Gehlen / Holotype ♂ 1941*" // red card with black margin: "Holotypus / *Call. tatarinovi / ssp. coreana Gehlen / Zool.* Staatssammlung München" // white card: "Sammlung / Gehlen" [box 259].

Actual status: Subspecies of *Callambulyx tatarinovi* (Bremer & Grey, 1852) (Bridges 1993).

coronata Gehlen, 1930

Amblypterus tigrina ssp. *coronata* Gehlen, 1930: Ent. Z. 44 (12): 174, f. 1.

Syntype: [♂] White card: "West Columbien / Rio Micay / Febr.-April 1928" // blue card with red margin, written over two unseparated labels, left side upright: "Coll. Gehlen Coll. Gehlen", level: "*Amplypterus / tigrina*

f. / *coronata* / *Type Gehlen* / *1930*" / / red card with black margin: "Holotypus / *Ampl. tigrina* / *ssp. coronata Gehlen* / Zool. Staatssammlung München" / / white card: "Sammlung / Gehlen" [box 163].

Actual status: Subspecies of *Adhemarius tigrina* (R. Felder, 1874) (Bridges 1993; Carcasson & Heppner 1996).

cubensis Gehlen, 1941

Xylophanes tersa ssp. *cubensis* Gehlen, 1941: Ent. Z. 55 (23): 179.

Syntype: [♀] White card: "*Cuba* / *Habana* / Zoologische / Staatssammlung / München" / / blue card with black margin, right side downwards: "Coll. Gehlen", level: "*Xylophanes tersa* / *cubensis* / *Type 1941 Gehlen*" / / red card with black margin: "Holotypus / *Xyloph. tersa* / *ssp. cubensis* / *Gehlen* / Zool. Staatssammlung München" / / white card: "Sammlung / Gehlen" [box 558].

Actual status: Subspecies of *Xylophanes tersa* (Linnaeus, 1771) (Bridges 1993; Carcasson & Heppner 1996).

delanoi Kernbach, 1962

Epistor lugubris ssp. *delanoi* Kernbach, 1962: Opusc. Zool. 63: 11.

Holotype:[♂] White card with black margin, left side upright: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Academy Bay / *7.V.59* / leg. J. Foerster" / / red card: "Typus" / / red card with black margin: "Holotypus / *Epistor lugubris* / *delanoi Kernb.* / Zool. Staatssammlung München" / white card with black margin: "K. Kernbach det. *60* / *Epistor lugubris* / *delanoi Kb.*" [box 390], [GP on specimen].

Actual status: Subspecies of *Enyo lugubris* (Linnaeus, 1771) (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996).

dispersa Kernbach, 1962

Erinnyis alope ssp. *dispersa* Kernbach, 1962: Opusc. Zool. 63: 9, f. 6.

Holotype: [♂] White card with black margin, left side upright: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Academy Bay / *9.V.59* / leg. J. Foerster" / / red card: "Typus" / / red card with black margin: "Holotypus / *Erinnis alope* / *dispersa Kb.* / Zool. Staatssammlung München" / white card with black margin: "K. Kernbach det. *1960* / *Erinnyis alope* / *dispersa Kb.*" [box 325], [GP on specimen].

Actual status: Subspecies of *Erinnyis alope* (Drury, 1773) (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996).

distincta Gehlen, 1934

Maassenia heydeni ssp. *distincta* Gehlen, 1934: Ent. Z. 48 (8): 60, f. 3.

Syntype: [♂] White card with black margin: "*Ampanihy* / *Madagascar* / *7.2.33.*" / / white card with black margin: "Genitaluntersuchung / B. Gehlen" / / yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Maassenia* / *heydeni distincta* / *Type Gehlen*" / / red card with black margin: "Holotypus / *Maassenia heydeni* / *ssp? distincta Gehlen* / Zool. Staatssammlung München" / / white card: "Sammlung / Gehlen" [box 496], [GP on specimen].

Later, Gehlen transferred this taxon from subspecific to species rank (Ent. Z. **55** (23): 179).
Actual status: Species of *Maassenia* Saalmüller, 1884 (Bridges 1993).

dominicana Gehlen, 1928

Protoparce rustica ssp. *dominicana* Gehlen, 1928: Int. Ent. Z. 21 (42): 391, pl.2, f. 2.

Holotype: [♀] White card: "*St. Domingo* / Zoologische / Staatssammlung / München" / / blue card with red margin, written over two unseparated labels, left side upright: "Coll. Gehlen Coll. Gehlen", level: "*Protoparce* / *rustica do=* / *minicana Gehlen* / *Type 1928 Gehlen* / *St. Domingo*" / / red card with black margin: "Typus ~~Nr~~. / *Pr. rustica f. domini-* / *cana* / Zoologische / Staatssammlung / München" [box 093].

Actual status: Subspecies of *Manduca rustica* (Fabricius, 1775) (Bridges 1993) or synonym of *Manduca rustica cubana* (Wood, 1915), (Carcasson & Heppner 1996) respectively. Gehlen (1928) stated that the holotype of *P. rustica dominicana* was deposited in the Berlin Museum (now the Zentralinstitut der Humboldt-Universität zu Berlin, Germany Institut für Systematische Zoologie, Museum für Naturkunde) and so the type status of the specimen in the ZSM remains to be confirmed.

encantada Kernbach, 1962

Erinnyis ello ssp. *encantada* Kernbach, 1962: Opusc. Zool. 63: 10.

Holotype: [♂] White card with black margin, left side upright: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Academy Bay / *7.V.59* / leg. J. Foerster" // red card: "Typus" // red card with black margin: "Holotypus / *Er. ello* / *encantada Kb* / Zool. Staatssammlung München" / white card with black margin: "K. Kernbach det. *1960* / *Erinnyis ello* / *encantada Kb.*" [box 336], [GP on specimen].

Actual status: Subspecies of *Erinnyis ello* (Linnaeus, 1758) (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996).

exiguus Gehlen, 1942

Protoparce lucetius ssp. *exiguus* Gehlen, 1942: Ent. Z. 56 (16): 127.

Syntype: [♂] White card: "*Uruguay* / *VI. 34.* / Zoologische / Staatssammlung / München" // red card: "Typus" // red card with black margin: "Typus ~~Nr.~~ / *Pr. lucetius* / *f. exiguus Geh.* / Zoologische / Staatssammlung / München" // white card: "Sammlung / Gehlen" [box 077].

Actual status: Subspecies of *Manduca lucetius* (Stoll, [1780])(Bridges 1993) or synonym of *Manduca lucetius* ssp. *lucetius* (Cramer, 1780) (Carcasson & Heppner 1996), respectively.

extrema Gehlen, 1926

Protoparce extrema Gehlen, 1926: Int. Ent. Z. 20 (21): 174.

"Type": [♂] White card with black margin: "*Rio Songo* / *Bolivia, 750m* / Coll. Fassl." // blue card with black margin, left side upright: "*Type* / Coll. Gehlen", level: "*Protoparce* / *extrema* / *Gehlen*" // red card with black margin: ♂ Typus ~~Nr.~~ / *Protop. extrema* / *Gehlen* / Zoologische Staatssammlung / München." // white card: "Sammlung / Gehlen" [box 103].

"Type": [♀] White card with black margin: "*Rio Songo* / *Bolivia* / *750m* / Coll. Fassl" // blue card with black margin, left side upright: "♀ *Type* / Coll. Gehlen", level: "*Protoparce* / *extrema* ♀ / *Gehlen*" // red card with black margin: ♀ Typus ~~Nr.~~ / *Protop. extrema Gehlen* / Zoologische Staatssammlung / München." // white card: "Sammlung / Gehlen" [box 103].

Actual status: Species of *Manduca* Hübner, [1807] (Bridges 1993; Carcasson & Heppner 1996).

In the ZSM there are two specimens labeled as "Type", a male and a female. Only the male specimen is mentioned in the original description as a "type", the female is not type material.

falcata Gehlen, 1922

Eurypteryx falcata Gehlen, 1922: Deut. Ent. Z. 1922 (3): 360, f.

Syntype: [♂] White card: "*Kaiser Wilh. Land* [Irian Jaya] / *Berg Gelu* / Zoologische / Staatssammlung / München" //grey card with red margin, right side downwards: "*N. Guinea*", level: "*Eurypteryx falcata* / *Gehlen* / *Type 1922* / *Berg Gelu, Kais. Wilh. Land*" //red card with black margin: "Holotypus / *Eurypteryx* / *falcata Gehlen* / Zool. Staatssammlung München" [box 516].

Actual status: Species of *Eurypteryx* Felder, 1874 (D'Abrera 1986; Bridges 1993).

falcifera Gehlen, 1943

Hemeroplanes falcifera Gehlen, 1943: Ent. Z. 57 (7): 50, f. 2.

Syntype: [♂] White card: "Zacualpan, III." // white card with black margin, left side upright: "Staatssamml. / München", level: "*Mex* / *Zacualpan*" [Mexico]// red card: "Typus" // red card with black margin: "Holotypus / *Hemeroplanes* / *falcifera Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 381].

Actual status: Species of *Callionima* Lucas, 1857 (Bridges 1993; Carcasson & Heppner 1996; D'Abrera 1986).

fassli Gehlen, 1928

Xylophanes rothschildi ssp. *fassli* Gehlen, 1928: Int. Ent. Z. 21 (42): 394, pl. 1, f. 5.

Holotype: White card with black margin: "Rio Songo / Bolivia / 750m / Coll. Fassl" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*1928* / *Xylophanes* / *rothschildi* / *fassli Gehlen* / *Type* ♂" // red card with black margin: "Holotypus / *Xyloph. rothschildi* / *f. fassali Gehlen* / Zool. Staatssammlung München"

// white card: "Sammlung / Gehlen" [box 549].

Actual status: Subspecies of *Xylophanes rothschildi* (Dognin, 1895) (Bridges 1993). Carcasson & Heppner 1996 retain it synonym.

florilega Kernbach, 1962

Celerio lineata ssp. *florilega* Kernbach, 1962: Opusc. Zool. 63: 16.

Holotype: [♂] White card with black margin, left side upright: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Finca Castro / 200m *9.V.59* / leg. J. Foerster" // red card: "Typus" // red card with black margin: "Holotypus / *Cel. lineata* / *florilega Kernb.* / Zool. Staatssammlung München" / white card with black margin: "K. Kernbach det. *1960* / *Celerio lineata* / *florilega Kb.*" [box 609], [GP on specimen].

Actual status: Subspecies of *Hyles lineata* (Fabricius, 1775) (Bridges 1993; Carcasson & Heppner 1996).

formosana Gehlen, 1941

Clanis bilineata ssp. *formosana* Gehlen, 1941: Ent. Z. 55 (23): 178.

Syntype: White card with black margin: "*Formosa* / coll. A. Closs" // yellow card with red margin: "*Clanis bilineata* / *formosana* / *Gehlen* / *Holotype ♀ 1941*" // red card with black margin: "Holotypus / *Clanis bilineata* / *(ssp?) formosana* / *Gehlen* / Zool. Staatssammlung München" [box 186].

Actual status: Subspecies of *Clanis bilineata* (Walker, 1866) (Bridges 1993).

fuscata Gehlen, 1941

Theretra oldenlandiae ssp. *fuscata* Gehlen, 1941: Ent. Z. 55 (23): 179.

Syntype: White card: "*Ceram* [Indonesia] / Zoologische / Staatssammlung / München" // yellow card with black margin, left side upright: "Coll. Gehlen", level: "*1941* / *Theretra olden=* / *landiae fuscata* / *♂ – Type Gehlen*" // red card with black margin: "Holotypus / *Th. oldenlandiae* / *ssp. fuscata Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 663].

Actual status: Subspecies of *Theretra oldenlandiae* (Fabricius, 1775) (Bridges 1993).

gehleni Bender, 1942

Rhagastis lunata ssp. *gehleni* Bender, 1942: Mitt. Münch. Ent. Ges. 32 (2/3): 649.

"Type": [♂] White card: "Simla 2600m / Simla Hill [NW India]" // white card with black margin: "*Rh. lunata* / *ssp. gehleni* / *Bender*" // red card with black margin: "Type / ~~coll.~~ Dr. R. Bender" // white card: "Sammlung / Gehlen" [box 671].

Actual status: Subspecies of *Rhagastis lunata* (Rothschild, 1900) (Bridges 1993).

gehleni Closs, 1922

Sesia gehleni Closs, 1922: Int. Ent. Z. 16 (14): 118.

"Type": [♂] White card with black margin, left side upright: "Coll. Gehlen", level: "*Rio Songo* / *Boliv.*" [Bolivia] // white card with red margin: "*gehleni* / *Type Closs*" // red card with black margin: "Holotypus / *Sesia gehleni Closs* / Zool. Staatssammlung München // white card: "Sammlung / Gehlen" [box 405].

Actual status: Species of *Aellopos* [Hübner, 1819] (Bridges 1993; Carcasson & Heppner 1996). It is mentioned in D'Abrera 1986 as not known to him.

There are no labels on the specimen that indicate Fassl as collector and an altitude of 750 m as collecting locality as it is written in the OD.

grandis Daniel, 1949

Protoparce grandis Daniel, 1949: Mitt. Münch. Ent. Ges. 35-39: 231, pl. 3.

Holotype: [♀] White card: "Hamborgo Velho / Rio grande d. Sul / Brasilien C. Ertl" // red card with black margin: "Holotypus / *Protoparce* / *grandis Daniel* / *1949* / Zool. Staatssammlung München" [box 108].

Actual status: Species of *Manduca* Hübner [1807] (Bridges 1993; Carcasson & Heppner 1996), mentioned in D'Abrera 1986 as unknown to the author.

hannemanni Closs, 1917

Xylophanes hannemanni Closs, 1917: Ent. Mitt. 6 (1/3): 33.

Holotype: [♂] White card with red margin: "*Mexico* / coll. A. Closs" // red card: "Typus" // grey card with red margin: "*hannemanni / Closs*" // red card with black margin: "Holotypus / *Xylophanes / hannemanni Closs* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 538].

Actual status: Species of *Xylophanes* Hübner, 1819 (D'Abrera 1986; Carcasson & Heppner 1996; Bridges 1993).

heinrichi Closs, 1917

Xylophanes heinrichi Closs, 1917: Ent. Mitt. 6 (4/6): 133, f.

Holotype: [♂] White card with black margin: "*Amazonas / 11.* [month illegible]. *12* / coll. A. Closs" // grey card with red margin: "*heinrichi / Closs*" // red card with black margin: "Holotypus / *Xyloph. heinrichi / Closs.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *1965 / Xylophanes / laelia Dru.*" [box 561], [GP on specimen].

Actual status: Species of *Xylophanes* Hübner, 1819 (Bridges 1993). Mentioned in D'Abrera 1986 as not known to him. Carcasson & Heppner 1996 put it into synonymy of *X. loelia* (Druce, 1878).

intermedia Gehlen, 1934

Amorpha populi ssp. *intermedia* Gehlen, 1934: Ent. Z. 48 (8): 60, f. 2.

Syntype: [♂] White card: "Malatia (Kurd. oc.) [Turkey] / *4.V.* / Coll Höfer, Wien" // red card: "Typus" // red card with black margin: "Holotypus / *Am. populi / ssp. intermedia Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 296].

Actual status: Subspecies of *Laothoe populi* (Linnaeus, 1758) (Bridges 1993) or synonym of *Laothoe populeti* (Bienert, 1870) (Danner et al. 1998), respectively.

intermissa Gehlen, 1941

Theretra alecto ssp. *intermissa* Gehlen, 1941: Ent. Z. 55 (24): 186, f. 2.

Syntype: Yellow card with black margin:, left side upright: "Coll. Gehlen", level: "*Taschkent*" [Usbekistan] // yellow card with red margin: "*Theretra alecto / ssp. intermissa / Gehlen / Holotype ♂ 1941*" // red card with black margin: "Holotypus / *Th. alecto / ssp. intermissa / Gehlen* / Zool. Staatssammlung München" [box 657].

Actual status: Subspecies of *Theretra alecto* Linnaeus, 1758 (Bridges 1993) or synonym of *Theretra alecto cretica* (Boisduval, 1827) (Danner et al. 1998), respectively.

jankowskii Gehlen, 1932

Clanis undulosa ssp. *jankowskii* Gehlen, 1932: Ent. Rundsch. 49 (8): 66, f. 3.

Syntype: [♂] White card with black margin: "Saishin / Nord-Korea / *14.7.28*" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Clanis undu= / losa jankowskii / Type Gehlen*" // red card with black margin: "Holotypus / *Cl. undulosa / ssp. jankowskyi* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 187].

Actual status: Subspecies of *Clanis undulosa* Moore, 1879 (Bridges 1993). D'Abrera 1986 mentions this taxon as individual form of *Clanis bilineata* Walker, 1866 distinguished from *undulosa* by having white tibiae instead of black.

lemonia Gehlen, 1941

Nyceryx lemonia Gehlen, 1941: Ent. Z. 55 (24): 185, f. 1.

"Type": [South America] Grey card with red margin: "*Nyceryx / lemonia Gehlen / Holotype ♂ 1941*" // red card with black margin: "Holotypus / *Nyceryx / lemonia Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *1964 / Nyceryx continua / WKR.*" [box 399], [GP on specimen].

Actual status: Synonym of *Nyceryx continua* (Walker, 1856) (Bridges 1993; Carcasson & Heppner 1996). The holotype of *N. lemonia* differs markedly from the specimens of *N. continua* in terms of e.g. coloration and thorax pattern, with which it was synonymized.

leucophila Gehlen, 1931

Protoparce leucophila Gehlen, 1931: Ent. Z. 45 (14): 201, f.1-3.

"Type": [♂] White card with black margin: "Mexico / ZACUALPAN / *VI. 13*" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Protoparce / leucophila Gehlen / Mexiko / Type. 1931*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. leucophila / Gehlen* / Zoologische / Staatssammlung / München." // white card: "Sammlung / Gehlen" [box 083], [GP on specimen].

Actual status: Species of *Manduca* Hübner, [1807] (Bridges 1993), or synonym of *Manduca morelia* (Druce, 1894) (Carcasson & Heppner 1996), respectively.

libanotica Gehlen, 1932

Celerio nicaea ssp. *libanotica* Gehlen, 1932: Ent. Rundsch. 49 (9): 85.

Syntype: White card: "Syria / Zahlé / Libanon or." // white card: "*21.VIII.30* / Zoologische / Staatssammlung / München" // yellow card with red margin, right side downwards: "Coll. Gehlen", level: "*Celerio nicaea / libanotica / ♂ – Type Gehlen*" // red card with black margin: "Holotypus / *Cel. nicaea / ssp. libanotica Geh.* / Zool. Staatssammlung München" [box 600].

Actual status: Subspecies of *Hyles nicaea* (Prunner, 1798) (D'Abrera 1986; Bridges 1993; Danner, Eitschberger & Surholt 1998).

lineatoides Gehlen, 1934

Celerio lineata ssp. *lineatoides* Gehlen, 1934: Ent. Z. 48 (8): 62.

"Type": [♂] White card: "*Uruguay / VI. 34.* / Zoologische / Staatssammlung / München" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Celeri lineata / lineatoides / Type Gehlen*" // red card with black margin: "Holotypus / *Cel. lineata / ssp? lineatoides* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 609].

Actual status: Subspecies of *Hyles lineata* (Fabricius, 1775) (Bridges 1993; Carcasson & Heppner 1996).

luciae Gehlen, 1928

Protoparce sexta ssp. *luciae* Gehlen, 1928: Int. Ent Z. 21 (42): 391, pl. 1, f. 2.

"Type": [♂] Yellow card with black margin, left side upright: "Coll. Gehlen", level: "*Kl. Antillen / St. Lucia*" // red card: "Type" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*P. sexta / luciae / Type Gehlen*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. sexta ssp. luciae / Gehlen* / Zoologische / Staatssammlung / München." // white card with black margin: "K. Kernbach det. *59 / g*[e]*wiß synonym / zu sexta paphus*" [box 063], [GP on specimen].

Actual status: Subspecies of *Manduca sexta* (Linnaeus, 1763) (Bridges 1993) or synonym of *M. sexta jamaicensis* (Butler, 1877) (Carcasson & Heppner 1996) respectively.

luridus Gehlen, 1944

Hippotion eson ssp. *luridus* Gehlen, 1944: Ent. Z. 57 (21): 166.

"Type": [♀] White card: "*Kamerun / Mulange- / Dummer* / Zoologische / Staatssammlung / München" //blue card with black margin, vertically scratched into two parts: "*Hippotion eson lu= / ridus Gehlen / Type 1943*" // red card glued on the blue label positioned in the last line between "Type" and "1943": "Typus" // red card with black margin: "Holotypus / *Hipp. eson / f. luridus Gehlen.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 638].

Actual status: Subspecies of *Hippotion eson* (Cramer, [1779]) (Bridges 1993).

Either type locality or labeling doubtful: Holotypic specimen with label "Kamerun". Type locality in the original description is "Réunion" [= Bourbon]. According to Viette & Guillermet (1996) the distribution of *H. eson* is whole Africa south of the Sahara, Seychelles, Comores, Madagascar, la Réunion, and Maurice. They consider the taxon *luridus* as being strongly doubtful.

macromaculata Gehlen, 1940

Oxyambulyx macromaculata Gehlen, 1940: Ent. Z. 54 (18): 140, f. 2.

"Type": [♂] White card: "Borneo" // white paper: "Samarinda, / Süd-Borneo / 9.-11-39" // yellow card with red margin, left side upright. "Coll. Gehlen", level: "*Oxyambulyx / macromaculata / Type Gehlen / S. O. Borneo*", right side downwards: "*1940*" // red card with black margin: "Holotypus / *Oxyambulyx / macromaculata / Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 174], [GP on specimen].

Actual status: Synonym of *Ambulyx obliterata* Rothschild, 1920 (Bridges 1993; D'Abrera 1986).

macrops Gehlen, 1933

Calasymbolus myops ssp. *macrops* Gehlen, 1933: Ent. Z. 47 (10): 80, f.5.

"Type": [♂] White card with black margin: "Mexico / TEHUACAN" // blue card with black margin, left side upright: "Coll. Gehlen", level: "*Calasymbolus / myops macrops / Type Gehlen*" // red card with black margin: "Holotypus / *Calas. myops / ssp. macrops Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 286], [GP on specimen].

Actual status: Synonym of *Paonias myops* (J. E. Smith, 1797) (Bridges 1993; D'Abrera 1986).

mahadeva Gehlen, 1935

Clanis mahadeva Gehlen, 1935: Ent. Z. 48 (24): 188, f. 1-3.

"Pseudotype": White card: "*Poona / S. India*" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Clanis / mahadeva ♂ / Type Gehlen*" // red card with black margin: "Holotypus / *Clanis / mahadeva Gehlen* / Zool. Staatssammlung / München" // white card: "Sammlung / Gehlen" [box 189].

Actual status: Species of *Clanis* (Hübner, 1819) (Bridges 1993).

Holotype with label "South India: Poona" but the type locality in the original description is "Bombay". The status of this specimen is clarified by Kitching & Cadiou (in press).

malatiatus Gehlen, 1934

Celerio hippophaes ssp. *malatiatus* Gehlen, 1934: Ent. Z. 48 (8): 61, f. 4.

Syntype: [♂] White card: "Asia min. / Malatya-Tecde / VIII" // white card: "*4.VIII.32.* / Zoologische / Staatssammlung / München" // yellow card with red margin, left side upright: "Coll. Gehlen", level: "*Celerio hippophaes / malatiatus Gehlen / Type 1934*" // red card with black margin: "Holotypus / *Cel. hippophaes / ssp. malatiatus Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 605].

Actual status: Subspecies of *Hyles hippophaes* (Esper, [1793]) (Bridges 1993) or synonym of *Hyles hippophaes caucasica* (Denso, 1913) (Danner et al. 1998), respectively.

martini Gehlen, 1943

Pachygonia martini Gehlen, 1943: Ent. Z. 57 (7): 49, f. 1.

Syntype: [♂] White card with black margin, left side upright: "Staatssamml. / München", level: "*Peru / Chanchamayo / La Merced*" // red card // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Pachygonia / martini Gehlen / Type Peru / 1943*" // red card with black margin: "Holotypus / *Pachygonia / martini Gehlen* / Zool. Staatssammlung München" [box 395], [GP on specimen].

Actual status: Species of *Pachigonidia* Fletcher & Nye, 1982 (Bridges 1993; Carcasson & Heppner 1996). It is also mentioned in D'Abrera 1986 as not known to the author, but the above syntype from the ZSM illustrated in the Appendix.

meridionalis Closs, 1917

Smerinthus planus ssp. *meridionalis* Closs, 1917: Ent. Mitt. 6 (4/6): 133.

"Type": [♂] White card with black margin: "*Kanton (China) / e. l. 12.VIII.13* / coll. A. Closs" // grey card with red margin: "*pl. meridionalis / Closs*" // red card with black margin: "Holotypus / *Sm. planus / f. meridionalis Closs* / Zool. Staatssammlung München" // White card: "Sammlung / Gehlen" [box 276].

Actual status: Subspecies of *Smerinthus planus* Walker, 1856 (Bridges 1993).

meridionalis Gehlen, 1931

Smerinthus kindermanni ssp. *meridionalis* Gehlen, 1931: Ent. Z. 45 (14): 202, f 2, 3.

"Type": [♂] White card: "Stargyugsa / Bashahr State / 5900m. August" [North India] // yellow card with red margin, written over one and a half labels, left side upright: "Gehlen Coll. Gehlen", level: "*Smerinthus / kindermanni / meridionalis / Type Gehlen*" // red card with black margin: "Holotypus / *Sm. kindermanni / ssp. meridionalis Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 263], [GP on specimen].

Actual status: Subspecies of *Smerinthus kindermanni* Lederer, 1853 (Bridges 1993). Replacement name for the preoccupied taxon *meridionalis* Gehlen, 1931: *Smerinthus kindermanni gehleni* Eitschberger & Lukhtanov, 1996.

mexicana Gehlen, 1933

Ampeloeca myron ssp. *mexicana* Gehlen, 1933: Ent. Z. 47 (14): 115, f. 1.

Holotype: [♂] White card with black margin: "Mexico / MISANTLA / *V. 12*" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Ampeloeca / myron mexica / = / na Gehlen Type*" // red card with black margin: "Holotypus / *Ampeloeca myron / ssp. mexicana / Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 475], [GP on specimen].

Actual status: Subspecies of *Darapsa myron* (Cramer, 1780) (Bridges 1993; Carcasson & Heppner 1996).

montana Daniel & Wolfsberger, 1955

Mimas tiliae ssp. *montana* Daniel & Wolfsberger, 1955: Z. Wien. Ent. Ges. 40: 63.

Holotype: Yellowish card, left side upright. "*Plank / München*", level: "*Bretter= / keller b. / Innsbruck / Tirol*" // white card with black margin: "*Ter. s. / Innsbruck Ug. / Plank leg.* / DANIEL MÜNCHEN" // red card: "*Holotypus ♂ / M. tiliae montana / Dan. et Wolfsb.*" // white card: "Abgebildet in / Forster-Wohlfahrt / Schmetterlinge Mitteleuropas / Bd. *3* Taf. *12* Fig. *3*" [box 253].

Actual status: Subspecies of *Mimas tiliae* (Linnaeus, 1758) (Bridges 1993). According to Pittaway (1993) and Danner et al. (1998), *montana* is just a form produced by high altitude or by chilling of the pupa of common *Mimas tiliae*. Therefore this taxon is synonymized by these authors.

norfolki Kernbach, 1962

Xylophanes norfolki Kernbach, 1962: Opusc. Zool. 63: 14, f. 12, 13.

Holotype: [♂] White card with black margin, left side upright: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Finca Castro / 200m *5.V.59* / leg. J. Foerster" // red card with black margin: "Holotypus / *Xylophanes / norfolki Kernb.* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. *60* / *Xylophanes / norfolki Kb.*" [box 558], [GP on specimen].

Actual status: Species of *Xylophanes* Hübner, 1819 (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996).

orientis Daniel, 1949

Pholus obliquus ssp. *orientis* Daniel, 1949: Mitt. Münch. Ent. Ges. 35-39: 230, pl. 2, fig. 3.

Holotype: [♂] White card with black margin, left side upright: "Staatssamml. / München", level: "*S. Catharina / Hansa Humboldt / X.*" [South Brazil] // red card with black margin: "Holotypus / *Pholus obliquus / ssp. orientis Daniel* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 432].

Actual status: Subspecies of *Eumorpha obliquus* (Rothschild & Jordan, 1903) (Bridges 1993; Carcasson & Heppner 1996).

otiosus Kernbach, 1957

Epistor bathus ssp. *otiosus* Kernbach, 1957: Deut. Ent. Z. N. F. 4 (1/2): 79, f. 3; pl. 1, f. 5.

Holotype: [♂] White card: "Rio Songo / Ost Bolivia / 750m / coll. Fassl." // red card: "Typus" // red card with black margin: "Holotypus / *Epistor bathus / otiosus Kb.* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. *56* / *EPISTOR / BATHUS / OTIOSUS KERNBACH*" [box 393], [GP on specimen].

Actual status: Subspecies of *Enyo bathus* (Rothschild, 1904) (Bridges 1993). Downgraded by Carcasson & Heppner (1996) to synonymy of *bathus*.

pallescens Closs, 1917

Xylophanes pallescens Closs, 1917: Ent. Mitt. 6 (4/6): 134.

"Type": [♀] White card with black margin: "*Pozuzo (Peru)* / coll. A. Closs" // grey card with red margin: "*pallescens* / *Closs*" // red card with black margin: "Holotypus / *Xylophanes libya* / *f. (ssp?) pallescens* / *Closs* / Zool. Staatssammlung München" [box 561].

Actual status: Species of *Xylophanes* Hübner, 1819 (Bridges 1993). Downgraded by Carcasson & Heppner (1996) to synonymy of *X. libya* (Druce, 1878).

pallidula Daniel, 1949

Protoparce incisa ssp. (f. oec.) *pallidula* Daniel, 1949: Mitt. Münch. Ent. Ges. 35-39: 232, pl. 2, fig. 1.

Holotype: [♂] White card: "*Mexico* / *Colima* / *VII. 24.* / Zoologische / Staatssammlung / München" // red card with black margin: "Holotypus / *Protoparce* / *incisa* / *ssp. pallidula Daniel* / Zool. Staatssammlung München" / / white card: "Sammlung / Gehlen" [box 86].

Actual status: Subspecies of *Manduca incisa* Walker, 1856 (Bridges 1993). Downgraded by Carcasson & Heppner (1996) to synonymy of *M. incisa*.

paraguayensis Gehlen, 1933

Xylophanes anubus ssp. *paraguayensis* Gehlen, 1933: Ent. Z. 47 (14): 116, f. 2.

Syntype: [♂] White paper, vertical scratched into two parts: "*Molinas* / *Decemb. 25* / *Xylophanes? poss* / *fosteri*" [Paraguay] // blue card with black margin, left side upright: "Coll. Gehlen", level: "*Xylophanes* / *anubus para* / = / *guayensis* / *Type Gehlen*" // red card with black margin: "Holotypus / *Xyloph. anubus* / *ssp. paraguayensis* / *Gehlen* / Zool. Staatssammlung München" [box 547].

Actual status: Subspecies of *Xylophanes anubus* (Cramer, [1777]) (Bridges 1993; Carcasson & Heppner 1996).

prestoni Gehlen, 1926

Protoparce prestoni Gehlen, 1926: Int. Ent. Z. 20 (21): 172.

Lectotype: [♂] White card, upper border with black margin: "Manicore / Amazonas" // blue card with red margin; left side upright: "*Type* / Coll. Gehlen", level: "*Protoparce* / *prestoni m* / *Gehlen*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. prestoni* / *Gehlen* / Zoologische / Staatssammlung / München." // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *56* / *Protoparce* / *incisa* / *prestoni* *Gehlen*" [box 086], [GP on specimen].

Actual status: Species of *Manduca* Hübner, [1807] (D'Abrera 1986; Carcasson & Heppner 1996) or subspecies of *Manduca incisa* Walker, 1856 (Bridges 1993), respectively.

reducta Gehlen, 1930

Protoparce reducta Gehlen, 1930: Int. Ent. Z. 24 (20): 217, f. 1.

"Type": Blue card, left side upright: "Coll. Gehlen", level: "Peru" // red card: "♀ Type" // red card with black margin: "Typus ~~Nr.~~ / *Protop. reducta* / *Gehlen* / Zoologische / Staatssammlung / München." [box 077].

Actual status: Species of *Manduca* Hübner, [1807] (D'Abrera 1986; Bridges 1993; Carcasson & Heppner 1996). *Protoparce reducta* was described from an unstated number of males, so it is unclear whether this specimen is type material.

reussi Closs, 1920

Xylophanes reussi Closs, 1920: Ent. Mitt. 9 (4/5): 86, f.

Holotype: [♀] White card with red margin: "*Brasilien* / coll. A. Closs" // red card: "Typus" // grey card with red margin: "*reussi* / *Closs*" // red card with black margin: "Holotypus / *Xylophanes* / *reussi Closs.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 537].

Actual status: Species of *Xylophanes* Hübner, 1819 (Bridges 1993). Downgraded by Carcasson & Heppner (1996) to synonymy of *X. pistacina* (Boisduval, [1875]).

rufescens Daniel, 1949

Perigonia pallida ssp. *rufescens* Daniel, 1949: Mitt. Münch. Ent. Ges. 35-39: 233.

Holotype: [♂] Blue card with black margin, left side upright: "Coll. Gehlen", level: "*Matto Grosso / (Stadt)* [Brazil] // red card with black margin: "Holotype / *Perigonia pallida / ssp. rufescens Daniel.* / Zool. Staatssammlung München" // white card "Sammlung / Gehlen" [box 401].

Actual status: Subspecies of *Perigonia pallida* Rothschild & Jordan, 1903 (Bridges 1993; Carcasson & Heppner 1996).

rydbergi Gehlen, 1933

Protambulyx rydbergi Gehlen, 1933: Ent. Z. 47 (10): 79, f. 1, 2, 3, 4.

Syntype: [♂] White card: "West-Columbien / Altaquem 500 m. / März-Juni 1927" // blue card with red margin, left side upwards: "Coll. Gehlen", level: "*Protambulyx / rydbergi / Type Gehlen*" // red card with black margin: "Holotypus / *Protambulyx / rydbergi Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 146], [GP on specimen].

Actual status: Species of *Protambulyx* Rothschild & Jordan, 1903 (Bridges 1993; Carcasson & Heppner 1996). It is mentioned in D'Abrera 1986 as unknown to the author.

samoana Gehlen, 1941

Theretra oldenlandiae ssp. *samoana* Gehlen, 1941: Ent. Z. 55 (23): 179.

"Type": [♂] White card: "*Samoa / Klingmüller*" // yellow card with black margin, left side upright: "Coll. Gehlen", level: "*Theretra olden= / landiae samoana / Type 1941 Gehlen*" // red card with black margin: "Holotypus / *Th. oldenlandiae / ssp. samoana Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 663], [GP on specimen].

Actual status: Subspecies of *Theretra oldenlandiae* (Fabricius, 1775) (Bridges 1993). The specimen in the ZSM is male, while in the OD the holotype is erroneously stated to be a female.

septentrionalis Gehlen, 1944

Pachylia syces ssp. *septentrionalis* Gehlen, 1944: Ent. Z. 57 (21): 166.

Syntype: [♀] White card with black margin, left side upright: "Staatssamml. / München", level: "*Mex / Cernavaca* [Mexico] / *VII. 14.* // grey card with black margin: "*Pachylia syces sep= / tentrionalis Gehlen / Type 1943*" // red card glued on the grey label positioned in the last line between "Type" and "1943": "Typus" // red card with black margin: "Holotypus / *Pachylia syces / ssp? septentrionalis / Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 356].

Actual status: Subspecies of *Pachylia syces* (Hübner, 1822) (Bridges 1993; Carcasson & Heppner 1996).

sericus Gehlen, 1940

Xylophanes sericus Gehlen, 1940: Ent. Z. 54 (18): 143, f. 6.

Lectotype: [♂] White card: "*Peru / Satipo* / Zoologische / Staatssammlung / München" // blue card with black margin, left side upright: "Coll. Gehlen", level: "*Xylophanes / sericus / Type Gehlen / Satipo, Peru*", right side, downwards: "*1940*" // red card with black margin: "Holotypus / *Xylophanes / sericus Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 538].

Actual status: Synonymized with *X. hannemanni* Closs, 1917 by Cadiou & Haxaire (1997), who designated the ZSM-type as lectotype. It is mentioned as valid species in Bridges (1993) and Carcasson & Heppner (1996), and it is mentioned in D'Abrera (1986) as not known to the author, but lectotype of the ZSM illustrated in the Appendix.

sinensis Closs, 1917

Celerio euphorbiae ssp. *sinensis* Closs, 1917: Ent. Mitt. 6 (1/3): 34.

Syntype: [♂] White card with red margin: "*Kanton / (China)* /coll. A. Closs" // grey card with red margin: "*e. sinensis / Closs*" // red card with black margin: "Holotypus / *Cel. euphorbiae / ssp. sinensis / Closs* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 586].

Actual status: Subspecies of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993). Transferred to subspecies of *Hyles costata* (Nordman, 1851) by Pittaway (1993). Raised to species rank (although not investigated) by Danner et al. (1998).

stigmaticus Gehlen, 1940

Polyptichus stigmaticus Gehlen, 1940: Ent. Z. 54 (18): 142, f. 4.

"Type": [♂] White card with black margin, left side upwards: "Staatssamml. / München", level: "*Afr. or. / Nyeri / 1800m 25.4.38.*" // blue card with red margin on left and upper side, left side upwards: "Coll. Gehlen", level: "*Polyptychus / stigmaticus / Type Gehlen / Nyeri, O. Afrika*", right side downwards: "*1940*" // red card with black margin: "Holotypus / *Polyptychus / stigmaticus Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 210].

Actual status: Synonym of *Andriasa contraria* Walker, 1856 (Bridges 1993).

sumatrana Gehlen, 1940

Marumba dyras ssp. *sumatrana* Gehlen, 1940: Ent. Z. 54 (18): 142, f. 5.

"Type": [♂] White card with black margin, left side upright: "Staatssamml. / München", level: "*Sumatra / Padang*" // yellow card, left side upright: "Coll. Gehlen", level: "*Marumba / dyras sumatrana / Type Gehlen / Padang*", right side downwards: "*1940*" // red card with black margin: "Holotypus / *Marumba dryas / ssp. sumatrana / Gehlen* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. *59 / Marumba / dyras javonica / K*" [box 221], [GP on specimen].

Actual status: Subspecies of *Marumba dyras* (Walker, 1856) (Bridges 1993).

syra Daniel, 1939

Hemaris fuciformis ssp. *syra* Daniel, 1939: Mitt Münch. Ent. Ges. 29 (1): 94, tab. 2, f. 18.

Holotype: White card, left side upwards: "*1000* m", level: "Taurus / Marasch [Turkey] / *19*.V.28 / E. Pfeiffer leg." // white card with black margin: "TAURUS / MARASCH *1000* M / PFEIFFER LEG. / *19.V.18.* / Franz Daniel München" // red card: ♂ TYPE VON / *H. fuciformis / ssp. syra Dan.* / DANIEL MÜNCHEN" // white card: "*abgeb. / Mit. Mü. E. G. / 1939; t.2 f.18*" // round red self adhesive label, left on rectangular carrier: "*2611*" [GP-number of Eitschberger] // white card: "ZSM ♂ / Genitalprp. / No. *Sp. 1385*" [box 413].

Actual status: Subspecies of *Hemaris fuciformis* (Linnaeus, 1758) (Bridges 1993). Most recently upraised to species rank by Danner, Eitschberger & Surholt, 1998.

syriaca Gehlen, 1932

Amorpha populi ssp. *syriaca* Gehlen, 1932: Ent. Rundsch. 49 (18): 184, f. 2.

"Type": White card with black margin, left side upright: "Staatssamml. / München", level: "*Syr. / Akbes*" // red card: "Typus" // yellow card with black margin, left side upright: "Coll. Gehlen", level: "*A. populi / syriaca Gehlen / ♂ – Type*" // red card with black margin: "Holotypus / *Am. populi / ssp. syriaca Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 296].

Actual status: Subspecies of *Laothoe populi* (Linnaeus, 1758) (D'Abrera 1986; Bridges 1993). Downgraded to synonymy of *Laothoe populeti* (Bienert, 1870) by Danner et al. (1998).

trigon Gehlen, 1926

Pholus achemon ssp. *trigon* Gehlen, 1926: Int. Ent. Z. 20 (28): 250.

"Type": [♀] White card, left side upwards: "Staatssamml. / München", level: "*Mexico*" // blue card with black margin, left side upwards: "*Type* / Coll. Gehlen", level: "*Pholus / achemon – / trigon Gehlen*" // red card with black margin: "Holotypus / *Pholus achemon / ssp. trigon Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 436].

Actual status: Subspecies of *Eumorpha achemon* (Drury, 1773) (Bridges 1993). Downgraded by Carcasson & Heppner (1996) to synonymy of *P. achemon*.

trinitatis Closs, 1917

Xylophanes neoptolemus ssp. *trinitatis* Closs, 1917: Int. Ent. Z. 11(10): 96.

Holotype: [♂] White card with black margin: "*Trinidad* / coll. A. Closs" // grey card with red margin: "*n. trinitatis* / *Closs*" // red card with black margin: "Holotypus / *Hyloph. neoptolemus* / *f. trinitatis Closs* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" // white card with black margin: "K. Kernbach det. *1965* / *Xylophanes* / *neoptolemus* / *St.*" [box 562], [GP on specimen].

Actual status: Subspecies of *Xylophanes neoptolemus* (Stoll, 1782) (Bridges 1993; Carcasson & Heppner 1996).

tupaci Kernbach, 1962

Pholus fasciatus ssp. *tupaci* Kernbach, 1962: Opusc. Zool. 63: 12, f. 9.

Holotype: [♂] White card with black margin, left side upwards: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Academy Bay / *26.IV.59* / leg. J. Foerster" // red card with black margin: "Typus" // red card with black margin: "Holotypus / *Pholus fasciatus* / *tupaci Kernb.* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. *1960* / *Pholus fasciatus* / *tupaci Kb.*" [box 445], [GP on specimen].

Actual status: Subspecies of *Eumorpha fasciatus* (Sulzer, 1776) (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996).

versicolor Gehlen, 1941

Callambulyx tatarinovi ssp. *versicolor* Gehlen, 1941: Ent. Z. 55 (23): 178.

"Type": White card: "Mongolei occ. / Provinz Ordos / Kwei-hwa-tschöng / 800 m Juli" // yellow card with red margin: "*Callambulyx tatari= / novi Br. u. Gr. / ssp. versicolor Gehlen / Holotype ♀ / 1941*" // red card with black margin: "Holotypus / *Call. tatarinovi* / *ssp. versicolor Gehlen* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 259].

Actual status: Subspecies of *Callambulyx tatarinovi* (Bremer & Grey, 1852) (Bridges 1993).

vespertilio (Esper, 1779)

Sphinx vespertilio Esper, 1779: Die Schmetterlinge 2: 178 (Suppl. 4, tab. 22, f. 4).

Holotype: [The specimens of coll. Esper are stored in little boxes which usually bear handwritings on the front, upper, and back side.] Upper side, left corner down: white label: "*716*"; middle: "*D. / Vespertilio*" // front side left: "*480.*", middle: "*Deilephila / Vespertilio.*" [box Esp. 14].

Actual status: Species of *Hyles* Hübner, [1819] (Bridges 1993; D'Abrera 1986; Carcasson & Heppner 1996; Danner, Eitschberger & Surholt 1998).

vogli Daniel, 1949

Protoparce florestan f. oecol. *vogli* Daniel, 1949: Boln. Ent. Venez. 8 (1/2): 28, pl. I.

Holotype: White card: "Caracas / Berg Avila / P. Cor. Vogl" // white card with black margin, left side upwards: "Staatssamml. / München", level: "*10./15. IV. 36.*" // Holotypus ♂ / *Protoparce* / *florestan* / *ssp. vogli Daniel* / Zool. Staatssammlung München" [box 107].

The name has been introduced in an available (subspecific) category, even when first published as "f. oecol.". The legend to the illustration on p. 29 of the original description is entitled "*Protoparce florestan* ssp. n. *vogli*". Bridges (1993) mentions this taxon on a subspecific rank, while Carcasson & Heppner (1996) consider it as individual form.

yupanquii Kernbach, 1962

Pholus labruscae ssp. *yupanquii* Kernbach, 1962: Opusc. Zool. 63: 13.

Holotype: [♂] White card with black margin, left side upwards: "Staatsslg. / München", level: "Galapagos-Inseln / Santa Cruz / Academy Bay / *8.V.59* / leg. J. Foerster" // red card with black margin: "Typus" // red card with black margin: "Holotypus / *Pholus labruscae* / *yupanquii Kb.* / Zool. Staatssammlung München" // white card with black margin: "K. Kernbach det. *60* / *Pholus labruscae* / *yupanquii Kb.*" [box 450], [GP on specimen].

Actual status: Subspecies of *Eumorpha labruscae* (Linnaeus, 1758) (D'Abrera 1986; Bridges 1993; Carcasson & Heppner 1996).

Erroneously labeled type specimens

barnesi Clark, 1919

Protoparce barnesi Clark, 1919: Proc. New Engl. zool. Club 6: 111, pl.13 f. 3.

"(Para)type": White card, left side upright: "Staatssamml. / München", level: "*Mexico / Colima / VII. 24.*" // blue card with red margin, left side upright: "Coll. Gehlen", level: "*Protoparce / barnesi Clark / ♂-Type Gehlen*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. barnesi Clark* / Zoologische / Staatssammlung / München." // white card with black margin: "K. Kernbach det. / *wahrscheinlich / Aberr. von PROTOPARCE / LICHENE – FLORESTAN*" // white card: "Sammlung / Gehlen" [box 109].

Actual status: Erroneously listed as a synonym of *Manduca scutata* Rothschild & Jordan, 1903 (Bridges 1993). Carcasson & Heppner 1996 mention it as species of *Manduca* Hübner, [1807].

The specimen of the ZSM is labeled as "type", but this is incorrect: According to the original description there has been collected only one female specimen which was described as *barnesi*. Therefore the specimen of the ZSM, which is collected in August 1924 was subsequently labeled as type years after the original description was published. Such subsequent type designation is nomenclaturally incorrect.

corumbensis Clark, 1920

Chlaenogramma corumbensis Clark, 1920: Proc. New Engl. zool. Club 7: 68.

Protoparce corumbensis Gehlen, 1928: Int. Ent. Z. 21 (42): 379, pl. 3, f. 1.

"Holotype": White card with black margin, left side upright: "Staatssamml. / München", level: "Matto Grosso / (Stadt)" [Brazil] // blue card with red margin, written over two unseparated labels, left side upright: "Coll. Gehlen Coll. Gehlen", level: "*Protoparce / corumben= / sis Clark / ♂ – Type 1928 / Gehlen / Matto Grosso*" // red card with black margin: "Typus ~~Nr.~~ / *Protop. corumbensis / Clark* / Zoologische / Staatssammlung / München" // white card: "Sammlung / Gehlen" [box 109], [GP on specimen].

The original description of this taxon confers to *Chlaenogramma corumbensis* Clark, 1920. Gehlen (1928) introduced the first known male of this species in the above cited journal, designated it as type, and transferred the species into the genus *Protoparce*. Such subsequent type designation is nomenclaturally incorrect.

Actual status: Species of *Manduca* Hübner, [1807] (D'Abrera 1986; Bridges 1993; Carcasson & Heppner 1996).

tessmanni Gehlen, 1927

Theretra tessmanni Gehlen, 1927: Int. Ent. Z. 21 (22): 174, f. 1.

"Holotype": White card: "*Kamerun* / Zoologische / Staatssammlung / München" // red card: "♀ Type" // blue card with black margin, left side upwards: "Coll. Gehlen", level: "*Th. tessman / = / ni Gehlen / ♀*" // red card with black margin: "Holotypus / *Theretra / tessmanni Gehlen.* / Zool. Staatssammlung München" // white card: "Sammlung / Gehlen" [box 653].

Actual status: Species of *Theretra* Hübner, 1822 (according to Bridges 1993, also mentioned in D'Abrera 1986 as not known to him).

Conferring to Bridges op. cit. the holotype (♂) is stored in the Museum für Naturkunde der Humboldt-Universität, Berlin (MNHU). The specimen of the ZSM is no type at all though bearing a "holotype" label. Two years after his original description Gehlen found a female of this taxon and designed it as "♀ holotype" (Gehlen 1929: Int. Ent. Z. 22 (39): 355). Such a subsequent type designation is nomenclaturally incorrect.

II. Name bearing types of unavailable taxa

The following taxa were explicitely introduced in an infrasubspecific category and are therefore unavailable.

albescens Closs

Holotype: ♀, [Germany] Berlin, e.l. 1908, coll. Gehlen [box 567].

The original description could not be found. The type specimen is labeled *Celerio euphorbiae* f. *albescens* Closs. It is an individual form of *Hyles euphorbiae* (Linnaeus, 1758). Maybe this taxon refers to *Celerio euphorbiae* f. *albicans* Closs, 1917 (Int. Ent. Z. 11 (17): 166). Not mentioned in Bridges (1993).

annellata Closs, 1915

Celerio euphorbiae f. *annellata* Closs, 1915: Int. Ent. Z. 9(1): 1.

Holotype: ♀, Deutschland, Berlin, 1913, e.l., coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

apiciplaga Gehlen, 1930

Celerio euphorbiae ab. *apiciplaga* Gehlen, 1930: Int Ent. Z. 24 (20): 219, f. 3.

Holotype: ♀, coll. Gehlen [box 582].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

atra Gehlen

Holotype: ♂, [box 352].

The original description could not be found. The type specimen is labeled *Pachylia ficus* f. *atra* Gehlen. It is an individual form of *Pachylia ficus* (Linnaeus, 1758).

auriflua Gehlen, 1930

Protoparce rustica rustica f. *auriflua* Gehlen, 1930: Ent. Z. 44 (12): 174.

Holotype: ♂, Blumenau m [Brazil], coll. Gehlen [box 091].

Individual form of *Manduca rustica* (Fabricius, 1775) (Bridges 1993; Carcasson & Heppner 1996).

charon Closs, 1910

Acherontia atropos f. *charon* Closs, 1910: Berl. Ent. Z. 54 (3/4): 224, pl.6, f. 13.

Holotype: ♀, Österreich, Kärnten, Landstrass, coll. Gehlen [box 025].

Individual form of *Acherontia atropos* (Linnaeus, 1758) (Bridges 1993).

cinnamomea Closs, 1911

Pholus satellitia posticatus f. *cinnamomea* Closs, 1911: Int. Ent. Z. 5(7): 51.

Holotype: ♀, Cuba, Guadanamo, coll. Gehlen [box 437].

Individual form of *Eumorpha satellitia* (Linnaeus, 1771) (Bridges 1993; Carcasson & Heppner 1996, where it is called "*cinnanomea*", which is an incorrect subsequent spelling).

clara Closs, 1917

Mimas tiliae f. *clara* Closs, 1917: Int. Ent. Z. 11 (9): 84.

Holotype: ♀, Deutschland, Berlin, 1.1.[19]12, coll. Closs [box 249].

Individual form of *Mimas tiliae* (Linnaeus, 1758). Not mentioned in Bridges (1993).

confluens Closs, 1912

Deilephila nerii f. *confluens* Closs, 1912: Int. Ent. Z. 6 (22): 123.

Holotype: ♀, Syrien, Cheiklé [box 457].

Individual form of *Daphnis nerii* (Linnaeus, 1758). Not mentioned in Bridges (1993).

confusa Gehlen, 1928

Celerio costata f. *confusa* Gehlen, 1928: Int. Ent. Z. 22 (2): 16, f 4.

Holotype: ♂, Kiachta, coll. Gehlen [box 591].

Individual form of *Hyles euphorbiae costata* (Nordmann, 1851). Not mentioned in Bridges (1993).

coniuncta Lütkemeyer, 1920

Deilephila euphorbiae ab. *coniuncta* Lütkemeyer, 1920: Ent. Z. 34 (13): 51.

Holotype: ♂, coll. Gehlen [box 582].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758). Not mentioned in Bridges (1993).

connexa Closs, 1915

Amplypterus gannascus f. *connexa* Closs, 1915: Int. Ent. Z. 9 (1): 1.

Holotype: ♂, S-Brasilien, Sao Paolo, coll. Gehlen [box 156].

Individual form of *Adhemarius gannascus* (Stoll, [1790]) (Bridges 1993; Carcasson & Heppner 1996).

cyanea Gehlen, 1928

Celerio dahli [missp.] ab. *cyanea* Gehlen, 1928: Int. Ent. Z. 21 (42): 401.

Holotype: ♂, [Italy], Sardinien, coll. Gehlen [box 589].

Individual form of *Hyles dahlii* (Geyer, 1827) (Bridges 1993).

decolorata Closs, 1913

Celerio euphorbiae f. *decolorata* Closs, 1913: Int. Ent. Z. 7(11): 73.

Holotype: ♂, Deutschland, Köpenick, e. l., 02.05.1913, coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

diluta Closs, 1917

Smerinthus ocellata f. *diluta* Closs, 1917: Int. Ent. Z. 11 (9): 82.

Holotype: ♀, Deutschland, Berlin, 1968, e.l., leg. Closs, coll. Gehlen [box 267].

Individual form of *Smerinthus ocellata* (Linnaeus, 1758). Not mentioned in Bridges (1993).

eburnea Closs, 1911

Psilogramma menephron increta f. *eburnea* Closs, 1911: Int. Ent. Z. 5 (38): 275.

Holotype: ♀, W-China, coll. Gehlen [box 042].

Individual form of *Psilogramma menephron* (Cramer, [1780]) (Bridges 1993).

exacta Gehlen, 1928

Protoparce albiplaga f. *exacta* Gehlen, 1928: Int. Ent. Z. 21 (42): 399.

Holotype: ♂, Brasilien, Matto Grosso, coll. Gehlen [box 097].

Individual form of *Manduca albiplaga* (Walker, 1856) (Bridges 1993; Carcasson & Heppner 1996).

extensa Closs, 1917

Celerio euphorbiae deserticola f. *extensa* Closs, 1917: Ent. Mitt. 6 (4/6): 130 pl. 6, f. 5.

Holotype: ♂, Algerien, Algier, coll. Gehlen [box 588].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758). According to Bridges (1993) it is a valid subspecies of *H. euphorbiae*.

extincta Gehlen, 1928

Herse convolvuli ab. *extincta* Gehlen, 1928: Int. Ent. Z. 21 (42): 398.

Holotype: ♂, Indonesien, Neu Mecklenburg, coll. Gehlen [box 017].

Individual form of *Agrius convolvuli* (Linnaeus, 1758) (Bridges 1993).

extinctus Gehlen, 1926

Pholus translineatus f. *extinctus* Gehlen, 1926: Int. Ent. Z. 20 (28): 251.

Holotype: ♀, [Ecuador] coll. Gehlen [box 435].

Individual form of *Eumorpha translineatus* (Rothschild, 1894) (Bridges 1993; Carcasson & Heppner 1996).

fasciata Closs, 1916

Psilogramma menephron f. *fasciata* Closs, 1916: Ent. Mitt. 5 (5/8): 199.

Holotype: ♂, Neu Guinea, Mount Kekea [Kebea?] [box 043].

Individual form of *Psilogramma menephron* (Cramer, [1780]) (Bridges 1993).

flavellus Gehlen, 1926

Amplypterus palmeri f. *flavellus* Gehlen, 1926: Int. Ent. Z. 20 (28): 252.

Holotype: ♂, Brasilien, Orgel-Gebirge, N. Friburgo, 850m [box 160].

Individual form of *Adhemarius palmeri* (Boisduval, 1875) (Bridges 1993; Carcasson & Heppner 1996).

flavescens Closs, 1911

Darapsa pholus f. *flavescens* Closs, 1911: Int. Ent. Z. 5(7): 51.

Holotype: ♂, USA, West Virginia, coll. Closs [box 477].

Individual form of *Darapsa pholus* (Cramer, 1776) (Bridges 1993; Carcasson & Heppner 1996). The type locality of *flavescens* according to the original description is Canada, but the specimen of the ZSM is from the USA.

flavosignata Closs, 1916

Sesia fadus f. *flavosignata* Closs, 1916: Entomol. Mitteilungen 5 (5/8): 200.

Holotype: ♀, Brasilien, Blumenau, A. Closs, coll. Gehlen [box 407].

Individual form of *Aellopos fadus* (Cramer, [1775]) (Bridges 1993; Carcasson & Heppner 1996).

fuliginosa Closs, 1917

Protoparce sexta paphus f. *fuliginosa* Closs, 1917: Int. Ent Z. 11 (16): 1.

Holotype: ♀, Brasilien, Sao Paolo, coll. Gehlen [box 065].

Individual form of either *Manduca sexta* (Linnaeus, 1763) (Bridges 1993) or *Manduca sexta paphus* (Cramer, 1779) (Carcasson & Heppner 1996) respectively.

fulvescens Closs, 1915

Amplypterus gannascus f. *fulvescens* Closs, 1915: Int. Ent. Z. 9(1): 1.

Holotype: ♀, Mexico, Orizaba, coll. Gehlen [box 153].

Individual form of *Adhemarius gannascus* (Stoll, [1790]) (Bridges 1993; Carcasson & Heppner 1996).

giganteomaculata Gehlen, 1930

Celerio euphorbiae conspicua ab. *giganteomaculata* Gehlen, 1930: Int Ent. Z. 24 (20): 218, f. 4.

Holotype: ♀, coll. Gehlen [box 585].

Individual form of *Hyles conspicua* (Rothschild & Jordan, 1903) (Bridges 1993). The specimen is ex err. labeled "*giganteopunctulata*" by Gehlen himself.

grisea Closs, 1911

Celerio euphorbiae f. *grisea* Closs, 1911: Int. Ent. Z. 5(38): 276.

Holotype: ♂, [Germany, Stuttgart], 04.06.1911, e.l., coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

grisescens Closs

Holotype: ♂, 26.03.1913, e.l., leg. Closs, coll. Gehlen [box 267].

The original description could not be found. The type specimen is labeled *Smerinthus ocellata* f. *grisescens* Closs. It is an individual form of *Smerinthus ocellata* (Linnaeus, 1758). Maybe this taxon refers to *Smerinthus ocellata* f. *grisea* Closs, 1917 (Int. Ent. Z. 11 (9): 82). Not mentioned in Bridges (1993).

infernalis Gehlen, 1926

Xylophanes anubus ab. *infernalis* Gehlen, 1926: Int. Ent. Z. 20 (28): 252.

Holotype: ♂, Brasilien, Santa Catharina, leg. E. A. Böttcher [box 547].

Individual form of *Xylophanes anubus* (Cramer, 1777) (Bridges 1993; Carcasson & Heppner 1996).

infumata Closs, 1911

Proserpinus (= Pterogon Boisd.*) proserpina* f. *infumata* Closs, 1911: Int. Ent. Z. 5 (38): 276.

Holotype: ♀, [Austria], Wien, 1.7[?].1911, coll. Gehlen [box 520].

Individual form of *Proserpinus proserpina* (Pallas, 1772) (Bridges 1993).

interrupta Closs, 1915

Amplypterus gannascus f. *interrupta* Closs, 1915: Int. Ent. Z. 9 (1): 1.

Holotype: ♀, Mexico, [box 153].

Individual form of *Adhemarius gannascus* (Stoll, [1790]) (Bridges 1993; Carcasson & Heppner 1996).

jachani Closs, 1921

Celerio euphorbiae f. *jachani* Closs, 1921: Int Ent Z. 15 (8): 62.

Holotype: ♂, Deutschland, Berlin, 03.07.1912, e.l., coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

krombachi Closs, 1917

Celerio euphorbiae f. *krombachi* Closs, 1917: Int Ent Z. 11 (9): 82.

Holotype: ♂, Deutschland, Berlin, e.l. 1913, coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758). Not mentioned in Bridges 1993.

luecki Closs, 1912

Hippotion (Chaerocampa) celerio f. *luecki* Closs, 1912: Int. Ent. Z. 6(22): 123.

Holotype: ♀, [Rep. South Africa], Natal, Durban, coll. Gehlen [box 637], *Hippotion aporodes* Closs.

Individual form of *Hippotion celerio* (Linnaeus, 1758) (Bridges 1993). The label with "*Hippotion aporodes* Closs" seems to be a former bottom-label, put to the specimen ex err.

magicus Gehlen, 1928

Amplypterus gannascus f. *magicus* Gehlen, 1928: Int. Ent. Z. 21 (42): 400, pl. 2, f. 3.

Holotype: ♀, Kolumbien, West-Cordillieren, Rio Aguacatal, coll. Gehlen [box 154].

Individual form of *Adhemarius gannascus* (Stoll, 1790) (Bridges 1993; Carcasson & Heppner 1996).

modestus Gehlen, 1942

Polyptychus grayi f. *modestus* Gehlen, 1942: Ent. Z. 56 (16): 128.

Holotype: ♂, [Rep. South Africa], Natal, Durban, coll. Gehlen [box 200], [GP on specimen].

Individual form of *Polyptychoides grayii* (Walker, 1856) (Bridges 1993).

mollis Gehlen, 1928

Amplypterus gannascus f. *mollis* Gehlen, 1928: Int. Ent. Z. 21 (42): 399, pl. 2, f. 1.

Holotype: ♂, Brasilien, St. Catharina, leg. E. A. Böttcher, coll. Gehlen [box 157].

Individual form of *Adhemarius gannascus* (Stoll, 1790) (Bridges 1993; Carcasson & Heppner 1996).

nebulosa Gehlen, 1930

Celerio euphorbiae ab. *nebulosa* Gehlen, 1930: Int Ent. Z. 24 (20): 219, f. 7.

Holotype: ♀, Deutschland, Berlin, 1924, coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

obscura Closs, 1915

Psilogramma menephron f. *obscura* Closs, 1915: Int. Ent. Z. 9 (1): 1.

Holotype: ♂, Ceylon [Sri Lanka], Kandy, coll. Gehlen [box 043].

Individual form of *Psilogramma menephron* (Cramer, [1780]) (Bridges 1993).

obscurata Closs, 1911

Haemorrhagia croatica f. *obscurata* Closs, 1911: Int. Ent. Z. 5(38): 275.

Holotype: ♂, [former Yugoslavia], Dalmatien, 1910, coll. Gehlen [box 415].

Individual form of *Hemaris croatica* (Esper, 1779) (Bridges 1993).

obscurata Closs, 1917

Acherontia atropos f. *obscurata* Closs, 1917: Int. Ent. Z. 11 (16): 1.

Holotype: ♀, Transvaal [South Africa], Leydenburg, coll. Gehlen [box 030].

Individual form of *Acherontia atropos* (Linnaeus, 1758) (Bridges 1993).

olivacea Closs, 1917

Celerio euphorbiae f. *olivacea* Closs, 1917: Int. Ent. Z. 11 (17): 166.

Holotype: ♀, Deutschland, Berlin, e.l., 1912, coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758). Not mentioned in Bridges (1993).

pallescens Closs, 1922

Marumba quercus f. *pallescens* Closs, 1922: Int Ent. Z. 16 (6): 51.

Holotype: ♀, Ungarn, coll. Gehlen [box 232].

Individual form of *Marumba quercus* ([Denis & Schiffermüller], 1775). Not mentioned in Bridges (1993).

pallida Closs

Holotype: ♀, Deutschland, Berlin, 1.1.1912, coll. Closs [box 582].

The original description could not be found. The type specimen is labeled *Celerio euphorbiae* f. *pallida* Closs. It is an individual form of *Hyles euphorbiae* (Linnaeus, 1758). This taxon is mentioned in 1913 (Int. Ent. Z. 7 (13): 89) by Closs himself and perhaps the name has been introduced in this article for the first time (nomen nudum). Not mentioned in Bridges (1993).

pallida Closs, 1917

Herse cingulata f. *pallida* Closs, 1917: Int. Ent. Z. 11(16): 153.

Holotype: ♀, N-Amerika, Pennsylvania, leg. Closs, coll. Gehlen [box 003].

Individual form of *Agrius cingulata* (Fabricius, 1775) (Bridges 1993).

pallida Closs, 1917

Pholus vitis f. *pallida* Closs, 1917: Int. Ent. Z. 11(16): 153.

Holotype: ♂, S-Brasilien, Santa Catarina, Blumenau [box 442].

Individual form of *Eumorpha vitis* (Linnaeus, 1758) (Bridges 1993; Carcasson & Heppner 1996).

pallida Closs, 1918

Pseudoclanis postica f. *pallida* Closs, 1918: Int. Ent. Z. 11(26): 241.

Holotype: ♂, Mombasa, Bulwa, coll. A. Closs, coll. Gehlen [box 193].

Individual form of *Pseudoclanis postica* (Walker, 1856) (Bridges 1993). The type locality given in the original description was Bulwa, Usambara, which is in Tanzania.

perversa Gehlen, 1928

Sphinx ligustri ab. *perversa* Gehlen, 1928: Int. Ent. Z. 21 (42): 399, pl. 3, f. 4.

Holotype: ♂, [Germany], Thüringen, Arnstadt, 1917, coll. Gehlen [box 130].

Individual form of *Sphinx ligustri* (Linnaeus, 1758) (Bridges 1993).

purpureosignata Closs, 1917

Gurelca masuriensis sangaica f. *purpureosignata* Closs, 1917: Int. Ent. Z. 11(16): 154.

Holotype: ♂, Japan, coll. Gehlen [box 514].

Individual form of *Gurelca masuriensis* (Butler, 1875) (Bridges 1993).

rangnowi Closs, 1911

Haemorrhagia croatica f. *rangnowi* Closs, 1911: Int. Ent. Z. 5(38): 275.

Holotype: ♂, [Russia], Kalmükensteppe, 1916, coll. A. Closs [box 415].

Individual form of *Hemaris croatica* (Esper, 1779) (Bridges 1993).

reducta Closs, 1917

Haemorrhagia tityus f. *reducta* Closs, 1917: Int. Ent. Z. 11 (9): 82.

Holotype: ♂, Deutschland, Berlin, Spandau, 7.8.1915, e.l., coll. Gehlen [box 410].

Individual form of *Hemaris tityus* (Linnaeus, 1758). Not mentioned in Bridges (1993).

rosea Closs, 1911

Hippotion celerio f. *rosea* Closs, 1911: Int. Ent. Z. 5(38): 276.

Holotype: ♀, Neu-Kaledonien, coll. A. Closs [box 635].

Individual form of *Hippotion celerio* (Linnaeus, 1758) (Bridges 1993).

rosea Closs, 1917

Celerio euphorbiae deserticola f. *rosea* Closs, 1917: Ent. Mitt. 6 (4/6): 130.

Holotype: ♂, Algerien, Algier, coll. Gehlen [box 588].

Individual form of *Hyles tithymali deserticola* (Bartel, 1899). Not mentioned in D'Abrera (1986), neither in Bridges (1993).

rosea Closs, 1917

Pholus satellita analis f. *rosea* Closs, 1917: Int. Ent. Z. 11(16): 153.

Holotype: ♂, [Brazil], Matto Grosso, coll. Closs [box 426].

Individual form of *Eumorpha satellitia* (Linnaeus, 1771) (Bridges 1993). Carcasson & Heppner (1996) retain it as synonym of *E. excessus* (Gehlen, 1926).

rubicunda Closs, 1916

Amplypterus palmeri f. *rubicunda* Closs, 1916: Entomol. Mitteilungen 5 (5/8): 200.

Holotype: ♀, S-Brasilien, coll. Gehlen [box 160].

Individual form of *Adhemarius palmeri* (Boisduval, 1875) (Bridges 1993; Carcasson & Heppner 1996).

rubicunda Closs

Holotype: ♀, Java [box 492].

The original description could not be found. The type specimen is labeled *Panacra elegantulus* f. *rubicunda* Closs. It is an individual form of *Panacra elegantulus* (Herrich-Schäffer, [1856]).

rubra Closs, 1918

Celerio euphorbiae mauretanica f. *rubra* Closs, 1918: Int. Ent. Z. 11(26): 241.

Holotype: ♂, [Tunisia], Tunis, coll. Gehlen [box 587].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

rubrimargo Gehlen, 1926

Amplypterus palmeri f. *rubrimargo* Gehlen, 1926: Int. Ent. Z. 20 (28): 252.

Holotype: ♂, Brasilien, Pirahy, coll. Gehlen [box 160].

Individual form of *Adhemarius palmeri* (Boisduval, 1875) (Bridges 1993; Carcasson & Heppner 1996).

tristis Closs, 1918

Xylophanes tersa f. *tristis* Closs, 1918: Int. Ent. Z. 11(26): 241.

Holotype: ♂, Mexiko [box 556].

Individual form of *Xylophanes tersa* (Linnaeus, 1771) (Bridges 1993; Carcasson & Heppner 1996).

umbrata Gehlen, 1928

Celerio euphorbiae f. *umbrata* Gehlen, 1928: Int. Ent. Z. 21 (42): 401, pl.2, f. 4.

Holotype: ♀, Österreich, Kärnten, coll Gehlen [box 571].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

unimacula Closs, 1915

Celerio euphorbiae f. *unimacula* Closs, 1915: Int. Ent. Z. 9 (1): 1.

Holotype: ♀, Deutschland, Berlin, 1913, e.l., coll. Gehlen [box 567].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

variegata Closs

Holotype: ♀, Deutschland, Berlin, e.l. 1912, coll. Gehlen [box 567].

The original description could not be found. The type specimen is labeled *Celerio euphorbiae* f. *variegata* Closs. It is an individual form of *Hyles euphorbiae* (Linnaeus, 1758). This taxon is mentioned in 1913 (Int. Ent. Z. 7 (13): 89) by Closs himself and perhaps the name has been introduced in this article for the first time (nomen nudum). Not mentioned in Bridges (1993).

virescens Gehlen, 1930

Celerio euphorbiae ab. *virescens* Gehlen, 1930: Int Ent. Z. 24 (20): 219.

Holotype: ♀, coll. Gehlen [box 582].

Individual form of *Hyles euphorbiae* (Linnaeus, 1758) (Bridges 1993).

viridis Closs, 1911

Mimas tiliae f. *viridis* Closs, 1911: Int. Ent. Z. 5 (38): 275.

Holotype: ♀, [Poland], Schlesien, Landeck, 18.05.1910, e.l., coll. Gehlen [box 250].

Individual form of *Mimas tiliae* (Linnaeus, 1758) (Bridges 1993).

III. Paratypes

afghanistana Daniel, 1958

3 Paratypes. Box 495
Bridges (1993): *Rethera* Rothschild & Jordan, 1903 sp.

amseli Daniel, 1958

1 Allotype, 3 Paratypes. Box 495
Bridges (1993): *Rethera* Rothschild & Jordan, 1903 sp.

atrolimbata Dannehl, 1929

3 Paratypes. Box 576
Bridges (1993): *Hyles euphorbiae* (Linnaeus, 1758) f.

bipartita Gehlen, 1934

1 Paratype, 458
Bridges (1993): *Daphnis nerii* (Linnaeus, 1758) ssp.

borealis Clark, 1929

1 Cotype, 1 Paratype. Box 284
Bridges (1993): *Calasymbolus excaecata* (Smith, 1797) ssp.

borealis Clark, 1929

3 Paratypes. Box 116
Bridges (1993): *Ceratomia undulosa* (Walker, 1856) ssp. syn.

borealis Clark, 1929

1 Cotype, 1 Paratype. Box 303
Bridges (1993): *Pachysphinx modesta* (Harris, 1839) ssp.

borealis Clark, 1929

1 Cotype, 2 Paratypes. Box 280
Bridges (1993): *Smerinthus cerisyi* Kirby, 1837 syn.

brodiei Clark, 1929

1 Cotype, 1 Paratype. Box 477
Bridges (1993): *Darapsa choerilus* (Cramer, [1779]) ssp.

comoroana Clark, 1927

1 Paratype. Box 035
Bridges (1993): *Coelonia solani* (Boisduval, 1833) ssp.

confluens Dannehl, 1925

1 Cotype. Box 026
Bridges (1993): *Acherontia atropos* (Linnaeus, 1758) f.

continentalis Gehlen, 1930

1 Paratype. Box 491
Bridges (1993): *Eupanacra doherty* (Rothschild, 1894) ssp.

corumbensis Clark, 1922

1 Paratype. Box 117
Bridges (1993): *Neogene dynaeus* (Hübner, [1825]) ssp. syn.

dantchenkoi Eitschberger & Lukhtanov, 1996

1 Paratype. Box 415
Danner, Eitschberger & Surholt (1998): *Hemaris ducalis* (Staudinger, 1887) ssp.

efulani Clark, 1926

1 Paratype. Box 516
Bridges (1993): *Antinephele* Holland, 1889 sp.

elegans Gehlen, 1935

1 Paratype. Box 376
Bridges (1993): *Callionima grisescens* Rothschild, 1894 ssp.

excessus Gehlen, 1926

1 Paratype. Box 425
Bridges (1993): *Eumorpha satellitia* (Linnaeus, [1771]) ssp.

expallidata Dannehl, 1933

3 Paratypes. Box 603
Hyles vespertilio (Esper, 1780) f.

explicata Dannehl, 1933

4 Paratypes. Box 602
Hyles vespertilio (Esper, 1780) f.

fraxini Dannehl, 1925

2 Paratypes. Box 132
Bridges (1993): *Sphinx ligustri* Linnaeus, 1758 f.

fruhstorferi Clark, 1916

1 "Paratype". Box 166
Bridges (1993): *Orecta* Rothschild & Jordan, 1903 sp.

[This specimen is not type material, *O. fruhstorferi* was described from a single male now in the Carnegie Museum, Pittsburgh.]

gerhardi Barnes & Benjamin, 1924

1 Paratype. Box 125
Bridges (1993): *Sphinx vashti* Strecker, [1878] syn.

hakodoensis O. Bang-Haas, 1936

3 Paratypes. Box 140
Bridges (1993): *Sphinx pinastri* Linnaeus, 1758 ssp.

hojeda Gehlen, 1928

1 Paralectotype. Box 540
Bridges (1993): *Xylophanes* Hübner, [1819] sp.

indicus Walker, 1856

1 "Allotype". Box 235
Bridges (1993): *Marumba* Moore, [1882] sp.

[This specimen is not type material.]

interrupta Closs, 1911

1 Paratype. Box 529
Bridges (1993): *Macroglossum hirundo* (Boisduval, 1832) f.

joiceyi Clark, 1924

1 Paratype. Box 666
Bridges (1993): *Rhagastis everetti* Rothschild & Jordan, 1903 syn.

joiceyi Clark, 1932

1 "Paratype". Box 642
Bridges (1993): *Hippotion* Hübner, 1819 sp.

[This specimen is not type material.]

laotensis Rothschild & Jordan, 1903

1 "Allotype". Box 222
Bridges (1993): *Marumba timora* Rothschild & Jordan, 1903 ssp.

[This specimen is not type material.]

lappona Rangnow, 1935

2 Paralectotypes. Box 296
Bridges (1993): *Amorpha populi* (Linnaeus, 1758) ssp.

manifica Brandt, 1938

2 Paratypes. Box 495
Bridges (1993): *Rethera komarovi* (Christoph, 1885) ssp.

mccrearyi Clark, 1929

1 Cotype. Box 286
Bridges (1993): *Paonias myops* (Smith, 1797) syn.

mccrearyi Clark, 1929

1 Paratype. Box 121
Bridges (1993): *Sphinx eremitus* (Hübner, [1823]) ssp.

meeki Rothschild & Jordan, 1903

1 Allotype. Box 493
Bridges (1993): *Angonyx* Boisduval [1875] sp.

moira Dannehl, 1925

1 Cotype. Box 026
Bridges (1993): *Acherontia atropos* (Linnaeus, 1758) f.

niepelti Gehlen, 1928

1 Paratype. Box 540
Bridges (1993): *Xylophanes fusimacula* (R. Felder, 1874) ssp.

obscura Closs, 1917

1 Cotype. Box 261
Bridges (1993): *Smerinthus kindermanni* Lederer, 1852 f.

obscura Dannehl

3 Paratypes. Box 603
Hyles hippophaes (Esper, 1793) f.

ochreata Mell, 1935

1 Paratype. Box 225
Bridges (1993): *Marumba* Moore, [1882] sp.

paganus Kernbach, 1957

1 Paratype. Box 394
Bridges (1993): *Enyo cavifer* Rothschild & Jordan, 1903 ssp.

pfeifferi Zerny, 1933

3 Cotypes, 1 Allotype. Box 515
Bridges (1993): *Sphingonaepiopsis gorgoniades* (Hübner, [1819]) ssp.

phalerata Kernbach, 1955

1 Paratype. Box 118
Bridges (1993): *Sphinx* Linnaeus, 1758 sp.

phillipinensis Rothschild & Jordan, 1903

1 Paratype. Box 198
Bridges (1993): *Polyptychus trilineatus* Moore, 1888 ssp.

poecilus Rothschild, 1898

1 Allotype. Box 257
Bridges (1993): *Callambulyx* Rothschild & Jordan, 1903 sp.

reconditus Kernbach, 1957

1 Paratype. Box 394
Bridges (1993): *Enyo cavifer* Rothschild & Jordan, 1903 ssp.

renneri Danner, Eitschberger & Surholt, 1998

54 Paratypes. Box 616
Danner et al. (1998): *Hyles* Hübner, [1819], 1817 sp.

rjabovi O. Bang-Haas, 1935

1 Cotype. Box 495
Bridges (1993): *Rethera komarovi* (Christoph, 1885) ssp.

rubiacensis Dannehl

4 Cotypes, 10 Paratypes. Box 576
Bridges (1993): *Hyles euphorbiae* (Linnaeus, 1758) f.

saharae Günther, 1939

8 Paratypes. Box 589
Bridges (1993): *Hyles tithymali* (Boisduval, 1834) ssp.

samoanum Rothschild & Jordan, 1906

1 Paratype. Box 529
Bridges (1993): *Macroglossum hirundo* (Boisduval, 1832) ssp.

tonganum Gehlen, 1930

1 Paratype. Box 529
Bridges (1993): *Macroglossum hirundo* (Boisduval, 1832) ssp.

transcaspica O. Bang-Haas, 1927

1 Paratype. Box 657
Bridges (1993): *Theretra alecto* (Linnaeus, 1758) ssp.

witti Danner, Eitschberger & Surholt, 1998

2 Paratypes. Box 301
Danner, Eitschberger & Surholt, 1998: *Laothoe philerema* (Djakonov, 1923) ssp.

zebra Clark, 1923

1 Cotype. Box 316
Bridges (1993): *Isognathus* Felder & Felder, 1862 sp.

IV. Synopsis

taxon	original name	author, year	type	box
acra	*Temnora reutlingeri acra*	Gehlen, 1934	syn	509
afghanistana	*Rethera afghanistana*	Daniel, 1958	para	495
aguacana	*Sesia titan aguacana*	Gehlen, 1944	type	407
albescens	*Celerio euphorbiae* f. *albescens*	Closs, [1917 ?]	holo	567
albina	*Pseudosphinx tetrio albina*	Gehlen, 1941	syn	315
alegrensis	*Xylophanes alegrensis*	Closs, 1915	holo	549
amseli	*Rethera amseli*	Daniel, 1958	allo, para	495
annellata	*Celerio euphorbiae* f. *annellata*	Closs, 1915	holo	567
apiciplaga	*Celerio euphorbiae* ab. *apiciplaga*	Gehlen, 1930	holo	582
argentinica	*Protoparce florestan argentinica*	Daniel, 1949	holo, allo, para	108
atra	*Pachylia ficus* f. *atra*	Gehlen	holo	352

taxon	original name	author, year	type	box
atrolimbata	*Celerio euphorbiae* ab. *atrolimbata*	Dannehl, 1929	para	576
auriflua	*Protoparce rustica* f. *auriflua*	Gehlen, 1930	holo	091
barnesi	*Protoparce barnesi*	Clark, 1919	no type	109
bilineata	*Xylophanes rothschildi bilineata*	Gehlen, 1928	type?	549
bipartita	*Daphnis nerii* f. *bipartita*	Gehlen, 1933	para	458
borealis	*Ceratomia undulosa borealis*	Clark, 1929	para	116
borealis	*Pachysphinx modesta borealis*	Clark, 1929	co, para	303
borealis	*Calasymbolus excaecata borealis*	Clark, 1929	co, para	284
borealis	*Smerinthus cerisyi borealis*	Clark, 1929	co, para	280
borneensis	*Oxyambulyx tattina borneensis*	Gehlen, 1940	type	178
bossardi	*Protoparce lefeburei bossardi*	Gehlen, 1926	holo	058
brodiei	*Darapsa pholus brodiei*	Clark, 1929	co, para	477
cana	*Oxyambulyx substrigilis cana*	Gehlen, 1940	type	175
castanella	*Theretra castanella*	Gehlen, 1942	syn	666
celebensis	*Oxyambulyx semifervens celebensis*	Jordan, 1919	no type	181
centrosplendens	*Protoparce centrosplendens*	Gehlen, 1940	type	095
ceylonica	*Marumba dyras ceylonica*	Kernbach, 1959	type	221
charon	*Acherontia atropos* f. *charon*	Closs, 1910	holo	025
chinchilla	*Protoparce chinchilla*	Gehlen, 1924	syntypes	095
cinnamomea	*Pholus satellita* f. *cinnamomea*	Closs, 1911	holo	437
clara	*Mimas tiliae* f. *clara*	Closs, 1917	holo	249
comoroana	*Coelonia solani comoroana*	Clark, 1927	para	035
confluens	*Acherontia atropus* [!] mod. *confluens*	Dannehl, 1925	co	026
confluens	*Daphnis nerii* f. *confluens*	Closs, 1912	holo	457
confusa	*Celerio euphorbiae costata* f. *confusa*	Gehlen, 1928	holo	591
conjuncta	*Celerio euphorbiae* ab. *conjuncta*	Lütkemeyer, 1920	holo	582
connexa	*Amplypterus gannascus* f. *connexa*	Closs, 1915	holo	156
continentalis	*Panacra dahertyi continentalis*	Gehlen, 1930	para	491
coreana	*Callambulyx tatarinovi coreana*	Gehlen, 1941	syn	259
coronata	*Amplypterus tigrina coronata*	Gehlen, 1930	syn	163
corumbensis	*Protoparce corumbensis*	Clark, 1928	no type	109
corumbensis	*Neogene dynaeus corumbensis*	Clark, 1922	para	117
cubensis	*Xylophanes tersa cubensis*	Gehlen, 1941	holo, para	558
cyanea	*Celerio dahli* ab. *cyanea*	Gehlen, 1927	holo	589
dantchenkoi	*Hemaris ducalis dantchenkoi*	Eitschberger & Lukhtanov, 1966	para	415
decolorata	*Celerio euphorbiae* f. *decolorata*	Closs, 1913	holo	567
delanoi	*Epistor lugubris delanoi*	Kernbach, 1962	holo, para	390
diluta	*Smerinthus ocellata* f. *diluta*	Closs, 1917	holo	267
dispersa	*Erinnyis alope dispersa*	Kernbach, 1962	holo, para	325
distincta	*Maassenia heydeni distincta*	Gehlen, 1934	syn	496
dominicana	*Protoparce rustica dominicana*	Gehlen, 1928	holo?	093
eburnea	*Psilogramma menephron* f. *eburnea*	Closs, 1911	holo	042
efulani	*Antinephele efulani*	Clark, 1926	para	516
elegans	*Hemeroplanes grisescens elegans*	Gehlen, 1935	para	376
encantada	*Erinnyis ello encantada*	Kernbach, 1962	holo, para	336
exacta	*Protoparce albiplaga* f. *exacta*	Gehlen, 1928	holo, para	097
excessus	*Pholus satellita* f. *excessus*	Gehlen, 1926	para	425
exiguus	*Protoparce lucetius exiguus*	Gehlen, 1942	syn	077
expallidata	*Celerio hippophaes* f. *expallidata*	Dannehl, 1933	para	603
explicata	*Celerio vespertilio* f. *explicata*	Dannehl, 1933	para	602
extensa	*Celerio deserticola* f. *extensa*	Closs, 1917	holo	588
extincta	*Herse convolvuli* ab. *extincta*	Gehlen, 1928	holo	017
extinctus	*Pholus translineata* f. *extinctus*	Gehlen, 1927	holo	435

taxon	original name	author, year	type	box
extrema	*Protoparce extrema*	Gehlen, 1926	type	103
falcata	*Eurypteryx falcata*	Gehlen, 1922	syn	516
falcifera	*Haemeroplanes falcifera*	Gehlen, 1943	syn	381
fasciata	*Psilogramma menephron* f. *fasciata*	Closs, 1916	holo	043
fassli	*Xylophanes rothschildi fassli*	Gehlen, 1928	holo	549
flavellus	*Amplypterus palmeri* f. *flavellus*	Gehlen, 1926	holo	160
flavescens	*Darapsa pholus* f. *flavescens*	Closs, 1911	holo	477
flavosignata	*Sesia fadus* f. *flavosignata*	Closs, 1916	holo	407
florilega	*Celerio lineata florilega*	Kernbach, 1962	holo, para	609
formosana	*Clanis bilineata formosana*	Gehlen, 1941	syn	186
fraxini	*Sphinx ligustri* ab. *fraxini*	Dannehl, 1925	para	132
fruhstorferi	*Orecta fruhstorferi*	Clark, 1916	no type	166
fuliginosa	*Protoparce sexta paphus* f. *fuliginosa*	Closs, 1917	holo	065
fulvescens	*Amplypterus gannescus* f. *fulvescens*	Closs, 1915	holo	153
fuscata	*Theretra oldenlandiae fuscata*	Gehlen, 1941	syn	663
gehleni	*Sesia gehleni*	Closs, 1922	type	405
gehleni	*Rhagastus lunata gehleni*	Bender, 1942	type	671
gerhardi	*Sphinx gerhardi*	Barnes & Benjamin, 1924	para	125
giganteomaculata	*Celerio euphorbiae conspicua* ab. *giganteomaculata*	Gehlen, 1930	holo	585
grandis	*Protoparce grandis*	Daniel, 1949	holo	108
grisea	*Celerio euphorbiae* f. *grisea*	Closs, 1911	holo	567
grisescens	*Smerinthus ocellata* f. *grisescens*	Closs, 1915	holo	267
hakodoensis	*Sphinx caligineus hakodoensis*	O. Bang-Haas, 1936	para	140
hannemanni	*Xylophanes hannemanni*	Closs, 1917	holo	538
heinrichi	*Xylophanes heinrichi*	Closs, 1917	holo	561
hojeda	*Xylophanes hojeda*	Gehlen, 1928	paralecto	540
indicus	*Smerinthus indicus*	Walker, 1856	no type	235
infernalis	*Xylophanes anubus* f. *infernalis*	Gehlen, 1927	holo	547
infumata	*Proserpinus proserpina* f. *infumata*	Closs, 1911	holo	520
intermedia	*Amorpha populi intermedia*	Gehlen, 1934	syn	296
intermissa	*Theretra alecto intermissa*	Gehlen, 1941	syn	657
interrupta	*Macroglossa hirundo* f. *interrupta*	Closs, 1911	para	529
interrupta	*Amplypterus gannascus* f. *interrupta*	Closs, 1915	holo	153
jachani	*Celerio euphorbiae* f. *jachani*	Closs, 1921	holo	567
jankowskii	*Clanis undulosa jankowskii*	Gehlen, 1932	syn	187
joiceyi	*Rhagastis joiceyi*	Clark, 1924	para	666
joiceyi	*Hippotion joiceyi*	Clark, 1924	no type	642
krombachi	*Celerio euphorbiae* f. *krombachi*	Closs, 1917	holo	567
laotensis	*Marumba timora laotensis*	Rothschild & Jordan, 1903	no type	222
lappona	*Amorpha populi lappona*	Rangnow, 1935	paralecto	296
lemonia	*Nyceryx lemonia*	Gehlen, 1941	type	399
leucophila	*Protoparce leucophila*	Gehlen, 1931	type	083
libanotica	*Celerio nicaea libanotica*	Gehlen, 1932	syn	600
lineatoides	*Celerio lineata lineatoides*	Gehlen, 1934	type	609
luciae	*Protoparce sexta luciae*	Gehlen, 1928	type	063
luecki	*Hippotion celerio* ab./f. *luecki*	Closs, 1912	holo	637
luridus	*Hippotion eson luridus*	Gehlen, 1943	type	638
macromaculata	*Oxyambulyx macromaculata*	Gehlen, 1940	type	174
macrops	*Calasymbolus myops macrops*	Gehlen, 1933	type	286
magicus	*Amplypterus gannascus* f. *magicus*	Gehlen, 1928	holo	154
mahadeva	*Clanis mahadeva*	Gehlen, 1935	no type	189
malatiatus	*Hyles hippophaes malatiatus*	Gehlen, 1934	syn	605

taxon	original name	author, year	type	box
manifica	*Rethera komarovi manifica*	Brandt, 1938	para	495
martini	*Pachygonia martini*	Gehlen, 1943	syn	395
mccrearyi	*Calasymbolus myops mccrearyi*	Clark, 1929	co	286
mccrearyi	*Sphinx eremita mccrearyi*	Clark, 1929	para	121
meeki	*Angonyx meeki*	Rothschild & Jordan, 1903	allo	493
meridionalis	*Smerinthus planus meridionalis*	Closs, 1917	type	267
meridionalis	*Smerinthus kindermanni meridionalis*	Gehlen, 1931	type	263
mexicana	*Ampeloeca myron mexicana*	Gehlen, 1933	holo, co	475
modestus	*Polyptichus grayi* f. *modestus*	Gehlen, 1942	holo	200
moira	*Acherontia atropus* [!] mod. *moira*	Dannehl, 1925	co	026
mollis	*Amplypterus gannescus* f. *mollis*	Gehlen, 1928	holo	157
montana	*Mimas tiliae montana*	Daniel & Wolfs-berger, 1955	holo, allo, para	253
nebulosa	*Celerio euphorbiae* ab. *nebulosa*	Gehlen, 1930	holo	567
niepelti	*Xylophanes fusimacula* f. *niepelti*	Gehlen, 1928	para	540
norfolki	*Xylophanes norfolki*	Kernbach, 1962	holo, para	558
obscura	*Celerio hippophaes* f. *obscura*	Dannehl	para	603
obscura	*Psilogramma menephron* f. *obscura*	Closs, 1915	holo	043
obscura	*Smerinthus kindermanni* g.aest. *obscura*	Closs, 1917	co	261
obscurata	*Acherontia atropos* f. *obscurata*	Closs, 1917	holo	030
obscurata	*Haemorrhagia croatica* f. *obscurata*	Closs, 1911	holo	415
ochreata	*Marumba ochreata*	Mell, 1935	para	225
olivacea	*Celerio euphorbiae* f. *olivacea*	Closs, 1917	holo	567
orientis	*Pholus obliquus orientis*	Daniel, 1949	holo, allo, para	432
otiosus	*Epistor bathus otiosus*	Kernbach, 1957	holo, para	393
paganus	*Epistor cavifer paganus*	Kernbach, 1957	para	394
pallescens	*Marumba quercus* f. *pallescens*	Closs, 1922	holo	232
pallescens	*Xylophanes pallescens*	Closs, 1917	type	561
pallida	*Pholus vitis* f. *pallida*	Closs, 1917	holo	442
pallida	*Pseudoclanis postica* f. *pallida*	Closs, 1918	holo	193
pallida	*Celerio euphorbiae* f./ab. *pallida*	Closs, [1913 ?]	holo	582
pallida	*Herse cingulata* ab. *pallida*	Closs, 1917	holo	003
pallidula	*Protoparce incisa pallidula*	Daniel, 1949	holo, para	086
paraguayensis	*Xylophanes anubus paraguayensis*	Gehlen, 1933	syn	116
perversa	*Sphinx ligustri* ab. *perversa*	Gehlen, 1928	holo, allo	130
pfeifferi	*Sphingonaepiopsis gorgon pfeifferi*	Zerny, 1933	allo, co	515
phalerata	*Sphinx phalerata*	Kernbach, 1955	para	118
phillipinensis	*Polyptichus trilineatus phillipinensis*	Rothschild & Jordan, 1903	para	198
poecilus	*Callambulyx poecilus*	Rothschild, 1898	allo	257
prestoni	*Protoparce prestoni*	Gehlen, 1926	lecto, paralecto	086
purpureosignata	*Gurelca himachala sangaica* f. *purpureosignata*	Closs, 1917	holo	514
rangnowi	*Haemorrhagia croatica* f. *rangnowi*	Closs, 1911	holo	415
reconditus	*Epistor cavifer reconditus*	Kernbach, 1957	para	394
reducta	*Protoparce reducta*	Gehlen, 1930	type?	077
reducta	*Hemaris tityus* f. *reducta*	Closs, 1917	holo	410
renneri	*Celerio renneri*	Danner, Eitschberger & Surholt, 1998	para	616
reussi	*Xylophanes reussi*	Closs, 1920	holo	537
rjabovi	*Rethera komarovi rjabovi*	O. Bang-Haas, 1935	co	495
rosea	*Hippotion celerio* f. *rosea*	Closs, 1911	holo	635
rosea	*Pholus satellita analis* f. *rosea*	Closs, 1917	holo	426

taxon	original name	author, year	type	box
rosea	*Celerio euphorbiae deserticola* f. *rosea*	Closs, 1917	holo	588
rubiacensis	*Celerio euphorbiae* f. *rubiacensis*	Dannehl	para, co	576
rubicunda	*Amplypterus palmeri* f. *rubicunda*	Closs, 1916	holo	160
rubicunda	*Panacra elegantulus* f. *rubicunda*	Closs	holo	492
rubra	*Celerio euphorbiae mauretanica* f./ab. *rubra*	Closs, 1918	holo	587
rubrimargo	*Amplypterus palmeri* f. *rubrimargo*	Gehlen, 1926	holo	160
rufescens	*Perigonia pallida rufescens*	Daniel, 1949	holo, para	401
rydbergi	*Protambulyx rydbergi*	Gehlen, 1933	syn	146
saharae	*Celerio deserticola* v. *saharae*	Günther, 1939	para	589
samoana	*Theretra oldenlandiae samoana*	Gehlen, 1941	type	663
samoanum	*Macroglossa hirundo samoanum*	Rothschild & Jordan, 1906	para	529
septentrionalis	*Pachylia syces septentrionalis*	Gehlen, 1943	syn	356
sericus	*Xylophanes sericus*	Gehlen, 1940	lecto	538
sinensis	*Celerio euphorbiae sinensis*	Closs, 1917	syn	586
stigmaticus	*Polyptichus stigmaticus*	Gehlen, 1940	type	210
sumatrana	*Marumba dyras sumatrana*	Gehlen, 1940	type	221
syra	*Haemorrhagia fuciformis syra*	Daniel, 1939	holo, co	413
syriaca	*Amorpha populi syriaca*	Gehlen, 1932	syn	296
tessmanni	*Theretra tessmanni*	Gehlen, 1927	no type	653
tonganum	*Macroglossum hirundo tonganum*	Gehlen, 1930	para	592
transcaspica	*Theretra alecto transcaspica*	O. Bang-Haas, 1927	para	657
trigon	*Pholus achemon trigon*	Gehlen, 1926	holo	436
trinitatis	*Xylophanes neoptolemus trinitatis*	Closs, 1917	holo	562
tristis	*Xylophanes reversa* f. *tristis*	Closs, 1918	holo	556
tupaci	*Pholus fasciatus tupaci*	Kernbach, 1960	holo, para	445
umbrata	*Celerio euphorbiae* f. *umbrata*	Gehlen, 1927	holo	571
unimacula	*Celerio euphorbiae* f. *unimacula*	Closs, 1915	holo	567
variegata	*Celerio euphorbiae* f. *variegata*	Closs, [1913 ?]	holo	567
versicolor	*Callambulyx tatarinovi versicolor*	Gehlen, 1941	type	259
vespertilio	*Sphinx vespertilio*	Esper, 1779	holo	Esp. 14
virescens	*Celerio euphorbiae* ab. *virescens*	Gehlen, 1930	holo	582
viridis	*Mimas tiliae* f. *viridis*	Closs, 1911	holo	275
vogli	*Protoparce florestan vogli*	Daniel, 1949	holo, allo, para	107
witti	*Laothoe philerema witti*	Danner, Eitschberger & Surholt, 1998	para	301
yupanquii	*Pholus labruscae yupanquii*	Kernbach, 1962	holo, para	450
zebra	*Isognatus zebra*	Clark, 1923	co	316

Zusammenfassung

Die vorliegende Arbeit ist eine Liste aller in der Zoologischen Staatssammlung München (ZSM) befindlichen Typenexemplare der Familie Sphingidae (Lepidoptera, Insecta). Aufgeführt werden 79 namenstragende Typen verfügbarer Taxa, sowie 65 Holotypen infrasubspezifischer Taxa, jeweils mit ihrer aktuellen systematischen Stellung. 54 Taxa liegen nur als Paratypen vor. In der Synopsis sind alle 198 in der ZSM durch Typen repräsentierten Taxa alphabetisch und mit der zugehörigen Kastennummer aufgeführt. Insgesamt befinden sich mit den Paratypenserien 417 Typenexemplare (Sphingidae) in der ZSM. Alle Etikettendaten sind in der ZSM auf Datenbank verfügbar und zugänglich (MS Access).

Acknowledgements

The authors wish to thank Dr. Ian Kitching, BMNH, for numerous comments and revision of the whole manuscript, Dr. Ulf Eitschberger for professional help especially in providing literature, and Dipl. Ing. Kurt Kossner for financial support. The work of the first author was supported by a grant of the association "Freunde der ZSM e.V."

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Viette, P. E. L. & C. Guillermet 1996. Lépidoptéres Hétérocères da la Réunion (=Bourbon). – Soc. réun. Amis Mus., Saint Denis

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Plate 1 ▷

(scale bar = 1 cm)

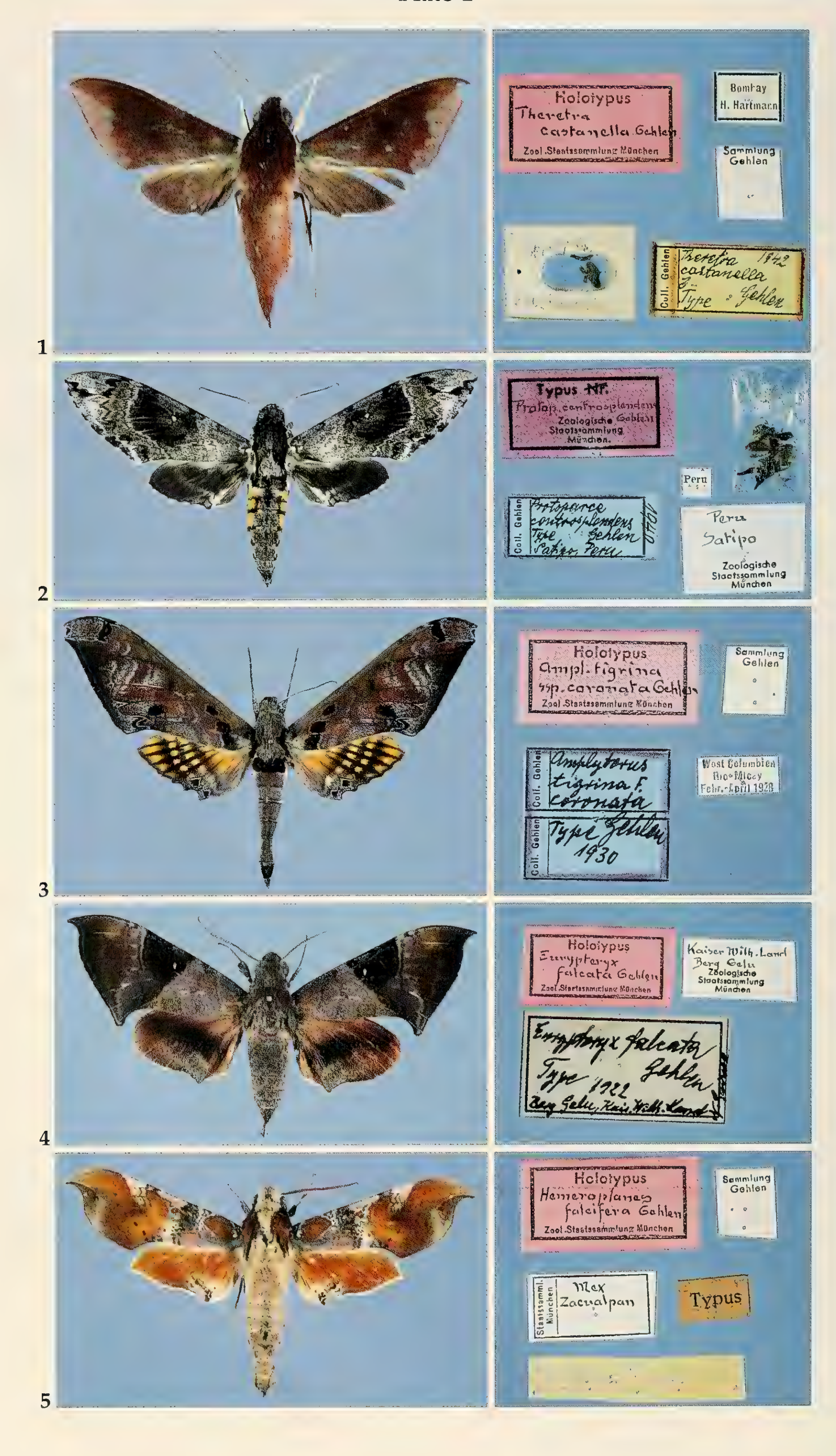
Fig. 1: *Theretra castanella* Gehlen, 1942, syntype
Fig. 2: *Protoparce centrosplendens* Gehlen, 1940, 'type', actually retained as synonym of *Manduca brunalba* (Clark, 1929)
Fig. 3: *Adhemarius tigrina coronata* (Gehlen, 1930), syntype
Fig. 4: *Eurypteryx falcata* Gehlen, 1922, syntype
Fig. 5: *Callionima falcifera* (Gehlen, 1943), syntype

Plate 2 ▷▷

(scale bar = 1 cm)

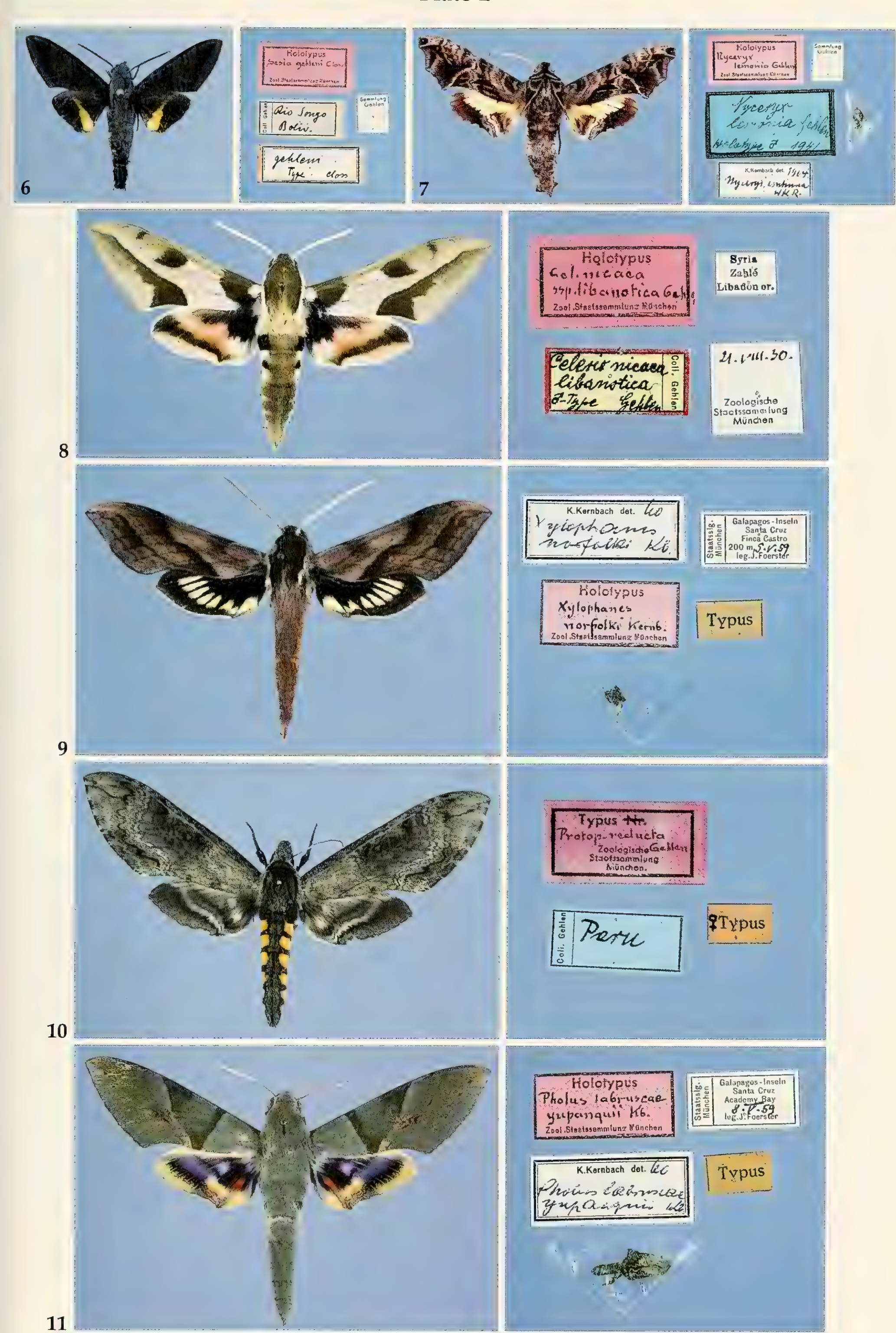
Fig. 6: *Aellopos gehleni* (Closs, 1922), 'type'
Fig. 7: *Nyceryx lemonia* Gehlen, 1941, 'type', actually retained as synonym of *Nyceryx continua* (Walker, 1856)
Fig. 8: *Hyles nicaea libanotica* (Gehlen, 1932), syntype
Fig. 9: *Xylophanes norfolki* Kernbach, 1962, holotype
Fig. 10: *Manduca reducta* (Gehlen, 1930), 'type' (?)
Fig. 11: *Eumorpha labruscae yupanquii* (Kernbach, 1962), holotype

Plate 1



Holotypus
Theretra
castanella Gehlen
Zool. Staatssammlung München
Bombay
H. Hartmann
Sammlung
Gehlen
Coll. Gehlen
Theretra 1942
castanella
Type Gehlen
1
Typus
Zoologische
Staatssammlung
München.
Peru
Coll. Gehlen
Protoparce
controsplendens
Type Gehlen
Satipo, Peru
Peru
Satipo
Zoologische
Staatssammlung
München
2
Holotypus
Ampl. tigrina
ssp. coronata Gehlen
Zool. Staatssammlung München
Sammlung
Gehlen
Coll. Gehlen
Amplypterus
tigrina f.
coronata
Coll. Gehlen
Type Gehlen
1930
West Columbien
Feb.-April 1928
3
Holotypus
Eurypteryx
falcata Gehlen
Zool. Staatssammlung München
Kaiser Wilh. Land
Berg Gelu
Zoologische
Staatssammlung
München
Eurypteryx falcata
Type 1922 Gehlen
4
Holotypus
Hemeroplanes
falcifera Gehlen
Zool. Staatssammlung München
Sammlung
Gehlen
Staatssamml.
München
Mex
Zacualpan
Typus
5

Plate 2


6
7
8
9
10
11
Holotypus
Celerio nicaea ssp. libanotica Gehlen
Zool. Staatssammlung München
Syria
Zablé
Libadon or.
Celerio nicaea libanotica ♂-Type Gehlen
Coll. Gehlen
Zoologische Staatssammlung München
K. Kernbach det.
Galapagos - Inseln
Santa Cruz
Finca Castro
Staatsslg. München
Holotypus
Xylophanes norfolki Kernb.
Zool. Staatssammlung München
Typus
Typus
Protop. reducta Gehlen
Zoologische Staatssammlung München
Coll. Gehlen
Peru
♀Typus
Holotypus
Pholus labruscae yupanquii Kb.
Zool. Staatssammlung München
Galapagos - Inseln
Santa Cruz
Academy Bay
Staatsslg. München
K. Kernbach det.
Typus

29. Stuke, J. H., D. Wolff & F. Malec 1998: Rote Liste der in Niedersachsen und Bremen gefährdeten Schwebfliegen (Diptera: Syrphidae). 1. Fassung vom 1.4.1997. – "Informationsdienst Naturschutz Niedersachsen 18 (1): 1-16 Hildesheim. Bezug: Niedersächsisches Landesamt für Ökologie Abt. Naturschutz, Postfach 101062, D-31110 Hildesheim. 16 S., illustr., geheftet.

Unter den Fliegen sind die Schwebfliegen wegen ihrer Schönheit schon seit jeher die Lieblingsfamilie für Sammler und Museen. Dies erklärt auch, warum sie die mit Abstand am besten erforschte Dipterenfamilie sind. Der faunistische Kenntnisstand liegt gerade bei dieser Familie in den meisten Bundesländern bei über 90 %, ein Kenntisstand, der von anderen artenreichen Dipterenfamilien nicht annähernd erreicht wird. Damit läßt sich etwas anfangen. Die Autoren haben hier nicht nur die gefährdeten, sondern alle in Niedersachsen und Bremen nachgewiesenen Arten aufgelistet,sodaß man auch einen Überblick über die nicht gefährdeten Arten bekommt. Zudem haben sie eine Reihe von Arten mangels Kenntnissen von einer Einstufung ausgenommen und mit einem Fragezeichen versehen – eine Ehrlichkeit, die sich gerade der Fachmann für die Weiterentwicklung der Roten Listen wünscht. Im Begleittext zur Artenliste wird die Lebensweise der Syrphiden besprochen, der derzeitige Kenntnisstand dargelegt, die Gefährdungskategorien festgelegt und die Schwierigkeiten bei der Einstufung diskutiert. In der Liste sind 4 Gefährdungsstufen zu finden, dazu 2 Stufen für nicht gefährdete Arten sowie die mit Fragezeichen versehen Arten. Hinweise zum Schwebfliegenschutz und das Literaturverzeichnis beschließen die Arbeit. Auf der letzten Seite stellen sich die Autoren vor. Wolfgang Schacht

30. Platnick N. I. 1997: Advances in Spider Taxonomy 1992-1995. With Rediscriptions 1940-1980. – Edited by P. Merrett, British Arachnological Society. 976 S.

Dieser Band setzt die Reihe der Kataloge in der Spinnen-Taxonomie fort. Die Bibliographie reicht bis ins Jahr 1867 zurück. Vor allem ist jedoch die Literatur zwischen 1991 und 1995 aufgenommen, die der letzte von N. Platnick erstellte Katalog (1988-1991) nicht beinhaltet. Während im letzten Band 652 relevante Arbeiten berücksichtigt wurden, umfasst der vorliegende Band 106 Spinnenfamilien aus insgesamt 913 Publikationen. Dies belegt in eindrucksvoller Weise, wie stark die Arbeit auf taxonomisch systematischem Gebiet, zumindest bei den Spinnen, in den letzten Jahren zugenommen hat. Laut Einführung wird dies der letzte Spinnenkatalog in Buchform sein. Die Fortsetzung der Katalogisierung wird in Zukunft laut N. Platnick auf CD-ROM bzw. im Internet erfolgen. Für jeden taxonomisch systematisch arbeitenden Arachnologen ist dieses Standardwerk unverzichtbar. B. Baehr

31. Roberts M. J. 1993: The spiders of Great Britain and Ireland. – Harley Books (B.H. & A. Harley Ltd.) Martins, Great Horkesley, Essex. Part 1 – Text. 203 S., 94 Plates of figures. Appendix 16 S., 6 Plates of figures. Part 2 – Colour Plates, 256 S., 237 Colour Plates.

Michael J. Roberts zeigt in diesen beiden Bänden seine enorme Kunst der genauen Darstellung. Seine Zeichnungen der weiblichen Epigynen und der männlichen Palpen sind so exakt, daß die Determination der einzelnen Arten im Gegensatz zu allen vorangegangenen Bestinmmungsbüchern enorm erleichtert wird. Die farbigen Ganzkörperabbildungen von über 250 Spinnenarten in Band 2 sind unübertroffen. Eine übersichtliche Familienbestimmungstabelle hilft die 30 hier vorkommenden Familien zu identifizieren. Während zahlreiche Gattungsschlüssel das Bestimmen erleichtern, sind die Arten sehr gut an Hand der exzellent gezeichneten Genitalstrukturen erkennbar. Es fehlen allerdings durchgehend Zeichnungen der weiblichen Vulven, sowie wird häufig auf ventrale Darstellungen der männlichen Palpen verzichtet, was in einigen Fällen die Determination einzelner Arten etwas erschwert. Die beiden Bände sind für jeden in Mitteleuropa arachnologisch arbeitenden Faunisten, Ökologen oder Systematiker wärmstens zu empfehlen. B. Baehr

SPIXIANA	**22**	3	245–246	München, 01. November 1999	ISSN 0341-8391

Siphonofusus somalicus, spec. nov., eine neue Buccinide aus Somalia

(Mollusca, Neogastropoda)

Manfred Parth

Parth, M. (1999): *Siphonofusus somalicus*, spec. nov., a new species of Buccinidae from Somalia (Mollusca, Neogastropoda). – Spixiana **22/3:** 245-246

Siphonofusus somalicus, spec. nov. from Somalia is described and compared with *Siphonofusus lubricus* (Dall, 1918) and *Siphonofusus brunobrianoi* (Parth, 1993).

Manfred Parth, Erzgiessereistraße 18c, D-80335 München, Germany

Von meinem Freund Igor Bondarev (Sewastopol/Ukraine) erhielt ich vor einiger Zeit ein Exemplar einer aus tiefen Gewässern vor Somalia gedredschten Buccinidenart, welche sich nach sorgfältiger Überprüfung als unbeschrieben herausstellte. Die ihr morphologisch am nächsten stehende Art ist *Siphonofusus lubricus* (Dall, 1918) aus Japan. *Siphonofusus brunobrianoi* (Parth, 1993), welche bei der Beschreibung unter Vorbehalt der Gattung *Buccinulum* Deshayes, 1830 zugeordnet wurde, ist die der neuen Art am nächsten stehende Art aus den Gewässern Somalias.

Siphonofusus somalicus, spec. nov.

Figs 1, 2

Type. Holotypus: Aus tieferen (150-200 m) Gewässern vor Mogadishu, Somalia (Zoologische Staatssammlung München, Eing. Kat.-Nr. 1999/1945)

Beschreibung

Maße. Holotypus: Höhe 71,0 mm, Breite 24,0 mm.

Glattes, dickschaliges Gehäuse mit hohem Gewinde und langem Siphonalkanal. Protoconch mit zwei Umgängen, Durchmesser 1,8 mm. Teleoconch mit runden, in den Proportionen gleichmäßigen sieben Umgängen, letzter Umgang mehr als die Hälfte der Gehäuselänge. Die ersten beiden Teleoconchumgänge mit markanter Axialskulptur, danach nur schwache Axiallinien, von der Naht bis über die Schulter hinaus sichtbar. Innenlippe glatt, sich deutlich von der Columella abhebend, mit kräftigem Dentikel, sowohl im Analbereich als auch am unteren Rande der Lippe, direkt an der Knickstelle zum langen Siphonalkanal. Außenlippe rund mit ca. 15 schwach ausgebildeten Zähnen. Langer, gerader Siphonalkanal, offen und nur leicht nach oben gerichtet. Kräftige Varix am letzten Umgang. Gehäusefärbung hellbraun mit unregelmäßigen, etwas dunklere Streifen in axialer Richtung. Varix auf letztem Umgang hell mit braunen Flecken. Auf dem letzten Umgang sind, vom Rand der Innenlippe ausgehend, braune unterbrochene Spiralreifen auf hellem Untergrund, sichtbar.

Etymologie. Nach dem Fundort benannt.



Figs 1, 2. *Siphonofusus somalicus,* spec. nov. Habitus. **1.** Ventralseite. **2.** Dorsalseite. Höhe: 71,0 mm.

Differentialdiagnose

Von *S. lubricus* unterscheidet sich die neue Art in folgenden Merkmalen:

1. Siphonkanal gerade und nicht nach rechts gebogen wie bei *S. lubricus.*
2. Gehäuse nahezu glatt, bei *S. lubricus* mit feiner Spiralskulptur überzogen.
3. Axialskulptur nur auf den ersten beiden Umgängen, bei *S. lubricus* auch auf den darauffolgenden Umgängen.

Von *S. brunobrianoi* unterscheidet sich die neue Art in folgenden Merkmalen:

1. Durch ihren wesentlich längeren Siphonalkanal.
2. Durch die sich von der Columella klar abgrenzende Innenlippe, während *S. brunobrianoi* eine nur schwach ausgebildete Innenlippe hat.
3. Weniger bauchige Umgänge mit viel schwächerer Axialskulptur.
4. Dunklere Gehäusefärbung als bei *S. brunobrianoi.*

Danksagung

Ich bedanke mich bei meinem Freund Igor Bondarev für die Bereitstellung des Typus.

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Kaicher, S. D. 1985. Pack 43, Buccinidae, Part I. – Card Catalogue of World-wide Shells. 148 p.
Parth, M. 1993. *Buccinulum brunobrianoi* n. sp. – La Conchiglia 269: 12-13

SPIXIANA	**22**	3	247–254	München, 01. November 1999	ISSN 0341-8391

Hancockia schoeferti, spec. nov., a new dendronotoidean nudibranch species from central Chile

(Gastropoda, Nudibranchia, Hancockiidae)

Michael Schrödl

Schrödl, M. (1999): *Hancockia schoeferti*, spec. nov., a new dendronotoidean nudibranch species from central Chile (Gastropoda, Nudibranchia, Hancockiidae). – Spixiana **22/3:** 247-254

Dendronotoid specimens reported from central Chile as "*Hancockia* sp. 1" by Schrödl (1996) are herein described anatomically and compared with other members of the genus *Hancockia* Gosse, 1877. The species studied comes closest to the rare northeastern Pacific species *H. californica* MacFarland, 1923, which has been reexamined here. It significantly differs from *H. californica* due to a distal allosperm receptacle rising from the vagina with a distinct stalk, while in *H. californica* the vagina is swollen to a wide sac which may also serve as a sperm receptacle. The Chilean species is therefore considered to be new; it is established under the name *Hancockia schoeferti* spec. nov. In contrast to other congeners, *Hancockia schoeferti* spec. nov. is locally abundant, living on kelp fronds and other macroalgae covered with hydrozoa on which it feeds.

Michael Schrödl, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

With only five species known the Hancockiidae are a small nudibranch family (see Thompson 1972). Possessing ramified cerata on the notal edge, a bilobed velum bearing finger-like processes, and rhinophoral sheaths, the single genus *Hancockia* Gosse, 1877 externally resembles typical dendronotoideans. However, the strongly contractile cerata are aberrant in shape, somewhat resembling human hands facing lateral. Anterior pairs of cerata are opposite while posterior ones alternate, with right cerata successively more posterior. In contrast to all other dendronotoideans, *Hancockia* possesses cnidosacs which Thompson (1972) described to contain functional nematocysts. Also the presence of an unpaired median buccal gland is unusual. While distributed worldwide throughout warmer oceans (see Thompson 1972), *Hancockia* was rarely found and never collected in large numbers. In central Chile, however, an undescribed *Hancockia* species was mentioned to be common (Schrödl 1996). A large number of specimens observed *in situ* and examined in their morphological and anatomical variation leads to a detailed description of this new Chilean species.

Methods

Most specimens of *Hancockia schoeferti*, spec. nov. have been collected using SCUBA. After observing the specimens *in situ* and in aquaria they were narcotized with a 10 % $MgCl_2$ solution and preserved in 70 % ethanol

or 4 % formalin/seawater. Six specimens were dissected. SEM examinations of radulae were made using a Philips XL 20 Scanning Electron Microscope. For comparision, material of similar species has also been studied: *Hancockia californica* MacFarland, 1923, 14 specimens (Zoological Museum Copenhagen; ZMUC), collected by H. Lemche, May 1954, Hopkins Marine Station, Monterey Bay, California, lower littoral, two dissected; *Hancockia uncinata* (Hesse, 1872): One specimen, collected by I. Friedrich, 03 June 1998, Fetovaia, Elba Island, Italy, on sea grass.

Hancockia schoeferti, spec. nov.

Figs 1,3,4,5

Types. Holotype: Zoologische Staatssammlung München (ZSM), No. 19983471, collected by M. Schrödl, 31 January 1994; Bay of Coliumo (36°32'S, 72°57'W), at 0-3 m depth, on fronds of *Macrocystis pyrifera* (L.) covered with hydrozoans. – Paratypes: ZSM No 19983472, 10, collected together with the holotype. ZSM No 19983473; 1, collected together with the holotype, dissected. Museo Zoológico de la Universidad de Concepción, Chile; 1, collected together with the holotype.

Additional material: 45 ex., collected by M. Schrödl, April to May 1991; Bay of Coliumo, at 0-5 m depth, on various macroalgae (*Macrocystis, Gracilaria, Iridaea, Ulva*) covered with hydrozoans; 32 ex., collected by M. Schrödl, January 1994; Bay of Coliumo, at 0-8 m depth, on various macroalgae covered with hydrozoans; 3 ex., collected by M. Schrödl, March 1994; Bay of Coliumo, at 0-2 m depth, on macroalgae; 16 ex., collected by M. Schrödl, December 1994; Bay of Coliumo, at 0-1 m depth, on giant kelp fronds covered with hydrozoans; 1 ex., collected by M. Schrödl, 29 January 1995; Queule (39°23'S, 73°13'W), at 8 m depth, on macroalgae.

Description

External morphology (Fig. 4). Actively crawling specimens measured up to 25 mm in length. Preserved specimens studied range between 1 and 10 mm in length. The body shape is elongate. Cerata occur in 4-5, rarely 6 pairs on the distinct notal rim, the first pair opposite and anterior to the prominent pericardium. In the postcardiac pairs the cerata on the right side are successively located more posterior than the left ones. Often there are four pairs of cerata and one additional, very small ceras on the left. The number of cerata is not directly correlated with the body size, e.g. living specimens from the same population with 2.5 and 20 mm both have 5 pairs of cerata. The two anterior pairs of cerata are large sized, more posterior ones decrease in size. Having a short stalk, the cerata are palmate distally, the largest cerata with 9-15 digitiform, candelabrum-like ramified processes. A specimen with 2.5 mm body length has up to 9, a 20 mm specimen up to 12 processes. Ramifications of the digestive gland extending into the cerata processes are visible through the tissue. The digestive ducts terminate within small, bulbous structures referred to as cnidosacs by most authors. The position of cnidosacs is externally marked by knob-like elevations. Zig-zaging notal ridges connecting the postcardiac cerata correspond to major vessels leading haemolymph from the cerata to the heart. The rhinophores are enclosed by a sheath having a lobulate edge with 5-12 warts. From posterodorsally, a single digestive gland duct extends into each rhinophoral sheath. Ramifying subapically, each branch terminates in cnidosacs which are visible as knob-like elevations on the edge of the rhinophoral sheaths. The clavi of the rhinophores are bulbous basally bearing about 10 vertical lamellae. They terminate within a short stalk with a small apical bulb. Eyes are visible behind the bases of the rhinophores. Two semilunar projections surround the mouth laterally. The oral veil is bilobed, each lobe is divided into 3-10 finger-like projections. The foot is slightly broader than the body wall. The anterior foot edge has a median notch. The tail is blunt and usually curled up in life. The anus is located on the right between the first and second cerata, the genital opening lateral between the rhinophore and the first ceras.

Colour (Fig. 4). Small specimens often are whitish translucent; ducts of the digestive glands may shine through the tissue. With increasing growth specimens become more and more dotted with red, brown and opaque white pigments. Depending on the quantity and relation of the different pigments, specimens appear red, reddish, greenish or olive, and are more or less spotted with white dots. Cerata, notal rims and rhinophore sheaths usually are stronger pigmented than foot, body walls and median parts of the notum. The stalks and apical bulbs of the rhinophore clavi are always white. Cnidosacs are usually marked with white pigment. The body colouration of larger individuals almost always corresponds to the main type of algal substrate, i.e. greenish colours for specimens from kelp but reddish for those from red algae.

Fig. 1. *Hancockia schoeferti,* spec. nov. SEM photograph of rhachidian and lateral radular teeth. Scale bar: 20 μm.

Fig. 2. *Hancockia californica* MacFarland. SEM photograph of rhachidian radular teeth. Scale bar: 10 μm.

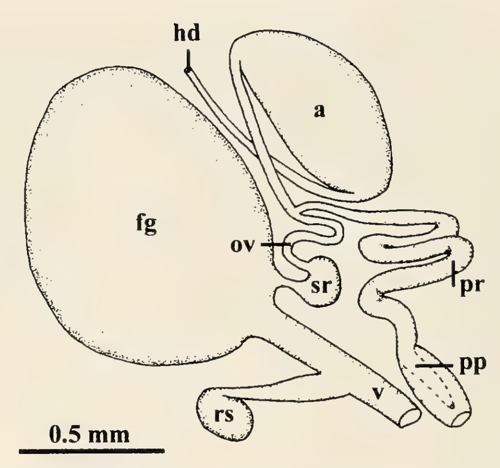


Fig. 3. *Hancockia schoeferti,* spec. nov. Outline of the genital system. Scale bar: 0.5 mm. Abbreviations: a: ampulla; fg: female glands; hd: hermaphroditic duct; ov: oviduct; pp: penial papilla; pr: prostatic vas deferens; rs: distal allosperm receptacle; sr: proximal seminal receptacle; v: vagina.

Digestive system (Figs 1 A,B). Around the mouth there are simple labial glands. The oral tube has a round, chitinized lip disk with rodlets. Ventrally, two long, highly ramified oral glands extend dorso-laterally into the shafts of the rhinophores. An additional median, unpaired oral gland extends posterior as a long, unbranched tube. The wide triangular, yellowish jaws are delicate. The masticatory border is denticulate. The radula formula is 46-55 × 1.1.1; in a specimen with a preserved body length of 6 mm it is 52 × 1.1.1. The central teeth have a large, slightly depressed median cusp with four to five smaller denticles per side. The base is highly arched, the height is similar to the width. The lateral teeth are thin rectangular plates with an elongate pointed cusp on the inner side. The base is more than twice as wide as the height at the cusp. Salivary glands are small and located on the esophagus as a rather diffuse mass. The esophagus is a slightly convoluted tube. Close to the stomach, a wide, sac-like gastric diverticulum arises dorsally. The anterior stomach is thin-walled. The left and right anterior digestive gland ducts branch off dorsally. The larger, posterior digestive gland duct opens ventro-posteriorly. The large, thick-walled posterior (grinding) stomach bears cuticular ridges. It covers the anterior stomach portion dorsally. The intestine forms a short loop towards the anus.

Reproductive system (Fig. 3). The genital system is androdiaulic. The gonad fills the posterior half of the body cavity. It consists of a high number of densely packed ancini joining into a hermaphroditic duct. The hermaphroditic ampulla is ovate. The rather long postampullar gonoduct leaves the elongate ampulla opposite the insertion. The vas deferens inmediately widens into a thick and convoluted prostatic portion. The muscular penial papilla is flagelliform. The vagina opens closely posterior to the male opening. Some distance inside, the tubular, wide vagina bears a narrowing duct which leads to a bulbous, rounded allosperm receptacle. Close to the insertion of the vagina, a short, narrow duct leaves the female gland mass. It enters a small, flattened, serially arranged sac which may be a proximal sperm receptacle. The oviduct is narrow and coiled.

Other organs. The cerebropleural ganglia are completely fused. There is a separate rhinophoral ganglion at the base of the clavus. The optical nerves are short. The buccal ganglia are close together. The kidney is a long sac with transversal diverticula covering the viscera dorsally.

Natural history (Fig. 4). All specimens were found in the upper subtidal between 0 and 8 m depth. Most were found to be perfectly camouflaged on macroalgae covered with hydrozoans. Some were offshore in masses of drifting kelp as also mentioned for *H. californica* by McDonald (1983). In the aquarium, specimens were observed to graze on the layer of hydrozoans covering a variety of different macroalgae from their collecting localities. Feeding appears not to be very selective since beside hydrozoans also small epiphytic algae such as diatomeans were ingested. Occasional pigment uptake from the algal substrate may cause the body coloration similar to their natural substrate observed in most larger specimens. In aquaria, no substrate preference related to brown or red algae could be



Fig. 4. *Hancockia schoeferti,* spec. nov. Drawing of a living specimen (15 mm length) with spawn in natural surrounding.



Fig. 5. *Hancockia schoeferti,* spec. nov. Geographic distribution.

observed for the differently coloured specimens. Several specimens were observed floating upside down on the water surface as described for *H. californica* and *H. ryrca* in their natural habitat (MacFarland 1966, Marcus 1957).

Small to large sized specimens and spawn were found from December to early May in the Bay of Coliumo. The spawn is a coiled ribbon (see Fig. 4), up to about 1 cm long and fixed to the substrate along one edge. Egg capsules are ovate, measuring up to 200 μm in length. There are 4 to about 10 small (< 100 μm in diameter) white eggs per capsule. Free swimming larvae hatched after 18 days in the aquarium (at 15-16 °C).

Geographic distribution (Fig. 5). *Hancockia schoeferti,* spec. nov. ranges from the central Chilean Bay of Coliumo (36°32'S, 72°57'W) south to Queule (39°23'S, 73°13'W) near Valdivia.

Etymology. *Hancockia schoeferti,* spec. nov. is dedicated to Mr. Lothar Schöfert for his generous financial support of the biosystematic research at the ZSM.

Discussion

Only five *Hancockia* species from the world's oceans were recognized as being valid by Thompson (1972). *Hancockia burni* Thompson, 1972, from tropical Australia has rhinophoral sheaths with digitate processes, while other known species including *H. schoeferti*, spec. nov. differ in having sheaths with more or less blunt or lobate processes. *Hancockia uncinata* (Hesse, 1872) reported from the Mediterranean Sea and northeastern Atlantic Ocean has broad, lobe-like, highly contractile cerata rising from the notal rim without forming a distinct stalk (see Schmekel & Portmann 1982, Cattaneo-Vietti et al. 1991, this study). *Hancockia uncinata* from the Spanish Atlantic coast was, however, figured as having cerata with distinct stalks by Ortea & Urgorri (1979). *Hancockia schoeferti*, spec. nov., the northeastern Pacific *H. californica* (MacFarland 1923, Behrens 1991, this study), and possibly also all other known congeners have cerata with a short but distinct stalk (see O'Donoghue 1932, Marcus 1957, Thompson 1972). A large specimen (15 mm length) of *Hancockia ryrca* Marcus, 1957 from Brazil was described as having only few digitiform processes per ceras (2-8). Even small *H. schoeferti*, spec. nov. have more than 8 processes and this seems also to be true for other congeners like *H. papillata* (O'Donoghue, 1932) which is only known from a single small specimen (4 mm length) from southern India (see Thompson 1972). The latter species is distinguished from *H. schoeferti* and other congeners by a row of mediodorsal papillae. *Hancockia californica* externally comes close to *H. schoeferti*. It may differ in often having 6 left and 5 right cerata (2-8 mm preserved body length; this study) while *H. schoeferti* spec. nov. usually has only 5 left and 4 right cerata. The digestive gland ducts ramify already at the bases of the rhinophores in *H. californica* (MacFarland 1923, this study) but closely below the lobulate edges of the rhinophoral sheaths in *H. schoeferti*.

Internally, *H. californica* and *H. schoeferti* largely agree regarding radular characters and the common possession of a gastric diverticulum (see Thompson 1972, this study). According to MacFarland (1923, 1966), the central cusp of rhachidian radular teeth is larger in relation to lateral denticles in *H. californica* than in *H. schoeferti*. One *H. californica* specimen studied by SEM herein has central cusps similarly shaped but more prominent than those of *H. schoeferti* (see Figs 1, 2). Another slight difference may or may not be related to the lateral teeth of *H. californica* having a pair of small basal denticles (MacFarland 1923) which have neither been detected in a specimen of *H. californica* dissected during the present study nor in *H. schoeferti*. The reproductive systems, however, are significantly different: *Hancockia californica* has an extremely large, bulbous penial papilla (MacFarland 1923, 1966, this study). In *H. schoeferti* the penial papilla is more slender having a flagelliform shape. The distal allosperm receptacle of *H. schoeferti* is connected to the vagina by a distinct duct. In contrast, the vagina of *H. californica* forms a swollen blind sac which may also function as a sperm receptacle but lacks a distinct stalk (MacFarland 1923, 1966, this study). The spawn was described to be green in *H. californica* by MacFarland (1966) while spawn was always white transparent in *H. schoeferti* spec. nov.

Concluding, the southeastern Pacific *H. schoeferti*, spec. nov. closely resembles the northeastern Pacific *H. californica* but can be clearly distinguished due to genital differences. Phylogenetic analysis might confirm them as real twin species isolated by the tropics as recently shown for two aeolid nudibranchs of the genus *Flabellina* Voigt, 1834 (Millen & Schrödl, unpublished information).

Acknowledgements

My gratitude goes to Nelly Vargas and Sebastian Gigglinger for their enthusiastic help catching the first specimens of *Hancockia schoeferti*, spec. nov. Tom Schiotte (ZMUC) kindly provided museum material of *H. californica* for examination. Ilka Friedrich from the Hydra-Institut für Meereswissenschaften in Elba, Italy, receives my thanks for providing specimens and photographs of *H. uncinata*. Ruth Kühbandner (ZSM) kindly prepared the colour drawing. Teresa Saks (LMU) is acknowledged for her language correction.

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A new anophthalmic genus of Perigonini from the Iberian Peninsula

(Insecta, Coleoptera, Carabidae)

Thorsten Assmann

Assmann, T. (1999): A new anophthalmic genus of Perigonini from the Iberian Peninsula (Coleoptera, Carabidae). – Spixiana **22/3:** 255-262

Galiciotyphlotes weberi, gen. nov., spec. nov. is described from the Sierra de Ancares, north-west Spain. The anophthalmic and micropterous member of the Perigonini is characterised by a yellow-brown, depressed body, a fine suture separating tempus and gena, 2 supraorbital setae along the interior side of the sutures, ciliated shoulders and glabrous elytra each with 8 striae, series umbilicata complete (16 setae), internal sac of the aedeagus without pigmented parts, but with a group of meshes (similar to *Perigonillus*), and parameres without setae or only small remnants of them. The systematic position of the new genus is discussed, the habitat described, and biogeographical notes are given.

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Introduction

Many anophthalmic ground beetle species belonging to the Scaritinae, Trechinae, Bembidiinae, and Zuphiinae are distributed on the Iberian Peninsula. In the superficial underground compartment of the Sierra de Ancares (Lugo, Galicia), a specimen of a new genus is found well-characterised as a member of the tribe Perigonini. In spite of painstaking efforts, no further specimens have since been detected. Because of monotypy, it is difficult at present to separate the generic and species diagnosis. So the latter largely concerns the proportions.

Deposition of the type

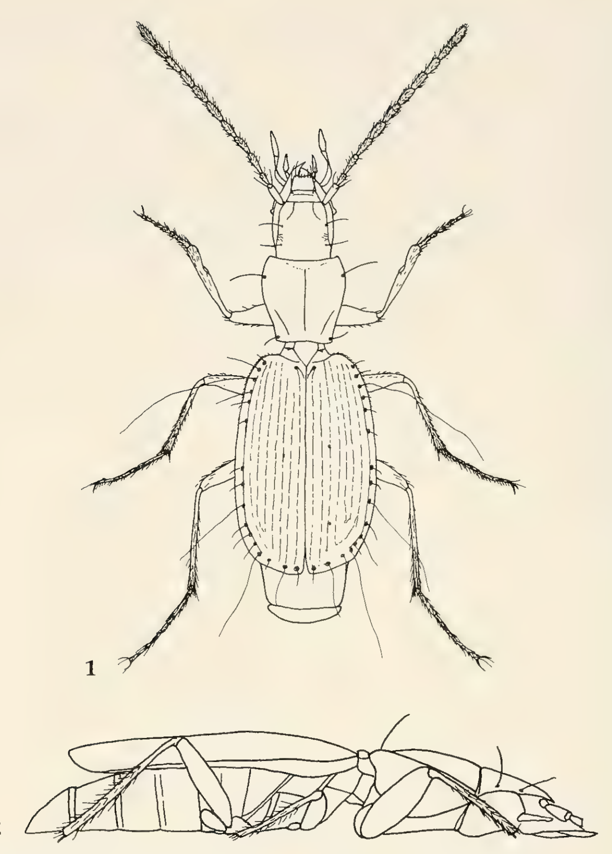
The holotype of the new species has been presented to the Zoologische Staatssammlung München, but is deposited as permanent loan in the collection of the author.

Galiciotyphlotes, gen. nov.

Figs 1-5a

Type species. *Galiciotyphlotes weberi*, spec. nov. by monotypy.

Diagnosis. Anophthalmic, micropterous, small-sized, depigmented, fore-body elongated, depressed (Figs 1, 2). Head with 2 pairs of supraorbital setae along the interior side of lateral sutures. Antennae long, pubescent from the second antennomere. Slightly dilated protarsi of male. Elytra glabrous, with



Figs 1-2. *Galiciotyphlotes weberi*, gen. nov., spec. nov. **1.** Habitus. **2.** Lateral view.

8 striae, and ciliated at the shoulder. Series umbilicata with 16 setae. Internal sac of the aedeagus without pigmented parts, but with a group of meshes. Parameres of the male genitalia without and with strongly reduced setae, respectively.

Description

The whole body yellow-brown coloured (incl. the appendices); microsculpture reticulated on the upper surface of the head, however composed of transverse lines and meshes on the pronotum, as well as on the elytra.

Head of medium size, elongated and parallel-sided, less constricted behind temporae; eyes seem to be completely absent; frontal furrows incomplete, only in the anterior third; tempus and gena separated from the frons and the vertex by a fine suture; 2 supraorbital setae along the interior side of these sutures; clypeus with 2 setae; labrum prolonged, anterior margin concave with 6 setae of which lateral longest, and sublateral small; mandibles feebly curved, comparatively short, not dentated; labial and maxillary palpi slender, penultimate segment of maxillary palpi shorter than the apical one and with narrow base, penultimate segment of labial palpi with 2 setae on the inner side, last segment of labial palpi conical (Fig. 3a); glossa with 2 setae; anterior margin of the mentum with a median tooth and a pair of setae, at the hind margin with 3 pairs of long setae, mentum and submentum/gula not separated by a suture (Fig. 3b); antennae long (about one-half of body length) and thin, from second antennomere onwards covered with hairs.

Pronotum strongly cordiform, its sides in the anterior half evenly rounded, posteriorly sinuated; 2 marginal setae, the anterior pair before the fore quarter, the posterior pair distinctly removed forward; fore angles pronounced (about 80°), hind angles bent upwards; lateral bead narrow; at the concave anterior border of the pronotum no margin; in the center of the disk a median sulcus

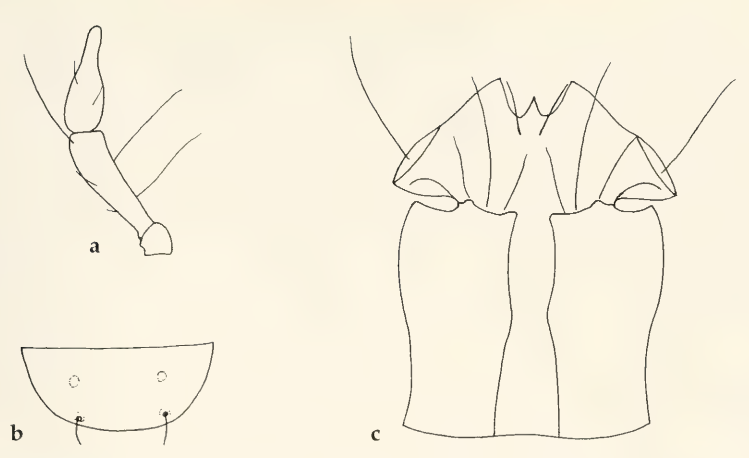


Fig. 3. *Galiciotyphlotes weberi*, gen. nov., spec. nov. Ventral surface. **a.** Labial palpus. **b.** Mentum, submentum, and glossa. **c.** Sternite VII.

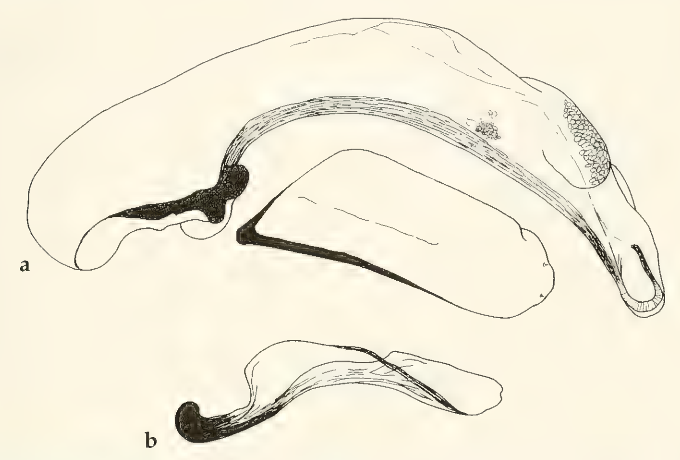


Fig. 4. *Galiciotyphlotes weberi*, gen. nov., spec. nov. ♂ genitalia. **a.** Aedeagus and left paramere. **b.** Right paramere.

developed, obsolete to the front and the base; 1 pair of pronotal foveae, without punctation and reduced to elongated impressions.

Elytra depressed, subparallel; shoulders rounded, prominent, and ciliated, not denticulated; epipleura simple; basal margin well developed and s-shaped; apex broad and somewhat truncated; 8 striae, not punctated, impressed, only in the apical parts interrupted, intervals flat; no recurrent part of the sutural stria; base of the first stria with a seta (scutellar seta), no scutellar stria; 3 discal setae near the third stria, the apical one small; 8th stria from the humeral group to the beginning of the apical group developed, in the apical part not discernible, at the end of the preapical group of the seria umbilicata a depression; umbilicate series complete (humeral group: setae 1-5, median group: setae 6-7, preapical group: setae 8-12, apical group: setae 13-16).

Metepisternum short, as long as wide at the anterior margin.

Abdominal sternites III to VII with 2 normal erect setae, not pubescent, with transverse microsculpture; sternite VII with an impression at the base of the setae and in front of them (Fig. 3c).

Legs long and slender; apical part of the tibiae pubescent and not distinctly grooved; first protarsal segment of male not and segments 2-4 only slightly dilated (Fig. 5a); the latter with adhesive setae on the lower side.

Male genitalia (Fig. 4). Aedeagus bent, apex rounded and with dark-brown pigmented cells forming a semicircle; internal sac without strongly pigmented parts (e.g. flagellum or ligula), but with

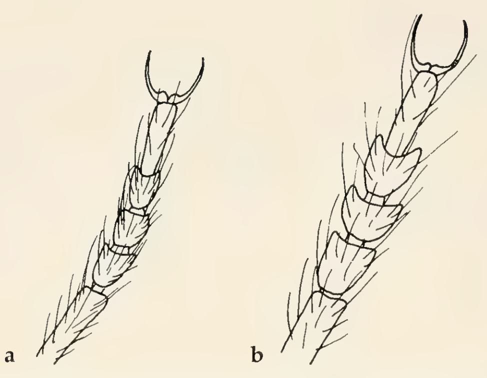


Fig. 5. Protarsi. **a.** *Galiciotyphlotes weberi*, gen. nov., spec. nov. **b.** *Typhlonestra elgonensis* Jeannel.

a group of well-recognisable meshes. Left paramere nearly parallel-sided, apex rounded; right paramere folded along the longitudinal axis, apex rounded. Two small remnants of setae at the posterior margin of the left paramere (visible only at strong magnification, 400 ×).

Etymology. Named from the region where the type species was found (Galicia) and from τυφλότης (typhlotes, blindness) due to the reduction of eyes.

Galiciotyphlotes weberi, spec. nov.

Figs 1-5a

Type. Holotype: ♂, NW-Spain, Lugo, Sierra de Ancares, Tres Obispos, 1300 m, 12.06.1997, leg. Th. Assmann.

Description

Body length from anterior margin of labrum to apex of elytra 4.1 mm. Head of medium size, 0.73 × as wide as pronotum. Antennae long, 0.51 × of body length; their scape 2.3 × as long as wide, 1.4 × as long as antennomere 2; the latter 1.8 × as long as wide; antennomere 3 as long as the 4th one and scarcely more slender; antennomeres 5-9 of similar length, but a little wider than the two previous ones; the ultimate antennomere 1.5 × as long as the penultimate one and 2.4 as long as wide. Pronotum nearly as long (in the middle) as wide; base 1.5 × as narrow as pronotal maximum; between the fore angles 1.1 × wider than between the posterior angles. Elytron about 1.7 × as long as wide and 2.6 × as long as pronotum (in the middle).

Distribution. Sierra de Ancares (Lugo, Galicia), north-western Iberian Peninsula. Known only from type locality.

Habits. The specimen was found on the lower side of a great stone within a dense *Ilex aquifolium* stand (other dominant species of the woodland are *Betula alba*, *Castanea sativa*, *Quercus pyrenaica*, *Erica arborea* and *Sorbus aucuparia*, for a more detailed description see Castro et al. 1997). For further information about the habitat see Discussion.

Etymology. This species is dedicated to the German carabidologist Friedrich Weber from the University of Münster, my doctoral supervisor, who introduced me to the study of ground beetles.

Discussion

Systematics

Basilewsky (1989) characterises the members of the tribe Perigonini (with particular consideration of African species) as follows: (1) 8th stria in the first half weakly developed, in the posterior part more pronounced, often forming together with the broad margin a parallel depression at the end of the

elytra; (2) the radial field of the elytra covered with short and dense hairs, whereas the elytra of most species are glabrous; (3) labrum with 6 setae; (4) 2 supraorbital and 2 prothoracal setae (for exceptions see Darlington 1968); (5) scutellar seta present, near the basis of the 2nd stria; (6) 3rd elytral interval with (in most species 3) setigerous small punctures; in some genera with additional punctures in the 5th and 7th interval; (7) the last dorsal puncture well removed from the hind margin of the elytra; (8) series umbilicata consists of 15 setae in 4 groups: humeral group (setae 1-5), median group (setae 6 and 7), preapical group (setae 8-10), and apical group (setae 11-15); in some genera the preapical and apical group are aggregated, in these cases a further seta is added between the two groups; (9) hind margin of the last visible abdominal sternite more or less bent or curved; in females margin in general finely and densely ciliated; a comparable pubescence lacking in males of many species (e.g. *Typhlonestra elgonensis* Jeannel, 1935); near the hind margin mostly 4 setae in males and 6-10 setae in females; (10) aedeagus only little differentiated, parameres without setae.

The characters (2)-(8) and (10) of this list are also realised in *Galiciotyphlotes*. In addition, other features referred to in the literature for the Perigonini have been detected in the new genus (e.g. penultimate segment of labial palpi with 2 setae on the inner side, epipleura simple, form of the palpi, cf. Jeannel 1942). Therefore the weak apical part of the 8th elytral stria, the development of the other striae on the elytra, and the deviant form of the abdominal sternite VII are the most important characters differing from other perigonine genera. The latter is extremely variable between the sexes within numerous species and between species of the same genus [e.g. *Euripogena congoana* (Burgeon, 1935), Basilewsky 1989], so it can only with restrictions be used as a character of the tribe. Moreover, the apical part of the 8th elytral stria is only slightly deepened in some genera (e.g. *Typhlonestra* Jeannel, 1935).

Galiciotyphlotes is similar to 2 Central African (and perhaps also South Asian) microphthalmic genera with 8th elytral stria deepened (at least slightly) towards the apex: *Typhlonestra* and *Perigonillus* Jeannel, 1935; this substantiates its assignation to the tribe. Numerous characters correspond: e.g. the overall habitus, the conical form of the last labial palpus segment, pronounced pronotal fore angles and upward bent pronotal hind angles with distinctly removed setae; short episternum of the metathorax; 16 setae in the series umbilicata; type of microsculpture on the surfaces of the head on the one hand and on the pronotum and the elytra on the other hand. The aedeagus of *Perigonillus* species shows a similar external form, only few strongly pigmented parts in the internal sac and a group of well-recognisable meshes.

The small, but pigmented eyes are a character of the genus *Perigonillus*. *Typhlonestra elgonensis* Jeannel, 1935 shows neither facets nor other cuticular structures of an eye. But in the ocular region a light brown spot in the anterior part of the cheek is recognisable ("une très petite aréole blanchâtre", Basilewsky 1989: 420). Similar spots located in the middle of the cheek are known from trechine beetles of the genus *Duvalius* (and from other ground beetles). Lamprecht & Weber (1979, 1982) observed that these so-called anophthalmic species are able to perceive light: in 12/12 hrs light/dark cycles locomotory activity was intensified by the signal "light on". Weber et al. (1996) detected in the ocular region of a *Duvalius* species with an oval pale spot a small eye cup, which contains rhabdomes with densely packed and highly ordered microvilli. It may be supposed that the similar spot of *Typhlonestra elgonensis* represents also a very regressive, nevertheless functioning eye.

Due to the exact description of *Perigonillus tonkinensis* by Silvestri, Basilewsky (1989) believed that this species is in fact a member of the genus *Typhlonestra*. The eyes of the species from Vietnam are composed of 10 pigmented ocelli. In *Galiciotyphlotes weberi*, ocelli as well as a lightened spot in the ocular region are not recognisable, meaning that this genus is (judging by its eyes) the most regressive one within the tribe.

Apart from the above-mentioned features, *Galiciotyphlotes* differs from the 2 African genera by slightly dilated protarsi (Fig. 5), depressed body, well-developed sutures on the head, and somewhat truncated elytral apex.

The genus *Galiciotyphlotes* combines plesiomorphic states (e.g. simple pattern of internal sac in the aedeagus, remnants of setae on the left paramere, simple chaetotaxy of the abdominal sternites, distinct striae on the elytra, shape of the 8th elytral stria) and apomorphic states (e.g. reduction of eyes and alae, fusion of the preapical and apical group of the series umbilicata). The apomorphic features are presumably related to an adaptation to the hypogeic habitat (regressive evolution of eyes and alae and progressive evolution by increasing the numbers of trichoid sensilla). Hence it may be supposed that *Galiciotyphlotes* is a member of an ancient lineage within the Perigonini. For a

more detailed analysis, a revision of the world Perigonini is necessary, as already demanded by Basilewsky (1989).

The new genus cannot be assigned to a supposed adelphotaxon* of the Perigonini: palpi not pubescent (in contrast to Omphreini and Lachnophorini); small body size, normal size of antennomere 1, only 2 pairs of pronotal marginal setae (in contrast to Omphreini); last and penultimate segment of maxillary palpus simple (in contrast to Lachnophorini); elytra glabrous, first antennomeres simple, dilated protarsi of male with normal adhesive setae (in contrast to Anchonoderini) (cf. Jeannel 1942).

Habitat. The soil type of the sampling site is an Atlantic Ranker with a deep AC profile on silicate rock (Franz 1979). Although the content of lime is poor in this rock stratum, many small crevices and cracks have developed in the C_1 horizon, which were described by Juberthie (1983) as habitat for many hypogeic species (superficial underground compartment or "milieu souterrain superficiel"). Franz (1979) was perhaps the first one to detect numerous anophthalmic and microphthalmic arthropods in this soil horizon of the Sierra de Ancares. Together with *Galiciotyphlotes weberi*, some beetles with reduced eyes have been found in the same habitat: the staphylinids *Domene gridellianum* Fagel, 1967, *Leptusa inexpectata* Fagel, 1967, *Leptusa asturiensis* Eppelsheim, 1880, *Leptusa scheerpeltzi franziana* Pace, 1981, the carabids *Trechus saxicola* Putzeys, 1870, *Reicheiodes microphthalmus* (Heyden, 1870) (cf. Balkenohl 1999), and the catopid *Speonomus vandalitae* Heyden, 1870. The list of epigeic carabids comprises 16 species, 11 of which are endemic for the north-western Iberian Peninsula: *Carabus lateralis* Chevrolat, 1840, *Carabus deyrollei* Gory, 1839, *Carabus amplipennis* Lapouge, 1924, *Leistus oopterus* Chaudoir, 1861, *Nebria galiciana* Jeanne, 1976, *Trechus gallaecus* Jeannel, 1921, *Argutor strenuus* (Panzer, 1797), *Melanius nigrita* (Paykull, 1790), *Haptoderus subiasi* Ortuño et Zaballos, 1992, *Haptoderus cantabricus* (Schaufuss, 1862), *Petrophilus brevipennis* (Chevrolat, 1840), *Oreophilus franzi* (Nègre, 1955), *Pterostichus cristatus* Dufour, 1820, *Anchomenidius astur* (Sharp, 1872), *Laemostenus oblongus* (Dejean, 1828), *Licinus aequatus* Serville, 1821 (for additional species see Novoa et al. 1989).

Biogeography

Due to the extremely low power of dispersal of endemic, anophthalmic and microphthalmic, hypogeic beetles, a long-lasting habitat continuity has to be postulated for the Sierra de Ancares. The glacial period had without any doubt decisively influenced the environment of hypogeic species. In regions of glacial permafrost soils the species are missing (e.g. in great parts of Central, West and North Europe: Holdhaus 1954, Franz & Beier 1970). They occur only in glacial refugia ("massifs de refuge") south of the Holdhaus borderline. In "older" vegetation maps for the last glacial period, tundra and steppe vegetation was postulated for the whole Iberian Peninsula (without the southern parts; e.g. Huntley & Birks 1983). New palynological results indicate also for the northern parts of Spain woodland refugia (Birks & Line 1993) and for the north-west of the peninsula (Galicia, Asturias) mixed woodlands and coniferous stands during the peak of glaciation (Castro et al. 1997). Therefore it has to be assumed that in this part of Spain the climatic conditions were also during the stadials mild and allowed a survival of hypogeic, anophthalmic beetles. In the rest of Spain (without the higher altitudes of mountains), the environmental conditions were so favourable that numerous anophthalmic carabid species survived (Fig. 6, cf. Franz 1963). The carabid fauna of the central Pyrenees which were heavily glaciated during the last glacial period seems to be depauperate, whereas in the regions which have never been glaciated the number of endemic and anophthalmic species is high (Assmann 1995). The differences between the massifs de refuge and the central parts are in the Pyrenees not as distinct as in the Alps with their "devastated" central region and the species-rich periphery (Holdhaus 1954). Further studies will show, if the greater areas without records of anophthalmic species in the north-west of the Iberian Peninsula are indeed not populated by such beetles or if they have not sufficiently been investigated up to now.

The tribe Perigonini has been recorded from Africa (without the north), southern Asia, Australia, Middle and South America (Basilewsky 1989). The only species known up to now from Europe is *Trechicus nigriceps* (Dejean, 1831) (often listed under the genus name *Perigona*), which comes originally from southern Asia, spread just during this century in Europe, and is capable of breeding in decaying

* It is not definitely known which tribe is the sister taxon of the Perigonini. The Anchonoderini are cited by some authors as Pterostichinae. Erwin (1985) includes the Perigonini and the Lachnophorini in the supertribe Lebiitae. For a detailed discussion of the systematic position of the Perigonini see Basilewsky (1989).



Fig. 6. Distribution of anophthalmic carabid genera on the Iberian Peninsula (incl. French parts of the Pyrenees) (modified after the data of Bonadona 1971, Sciaky 1989, Saldago-Costas 1993, Zaballos & Jeanne 1994). The genus *Parareicheia* is incorporated and the genus *Reicheia* Saulcy 1863 is excluded due to the characterisation of Jeannel (1957) as anophthalmic or microphthalmic, respectively (but see also Sciaky 1989). *Apoduvalius* is taken into account because the physiological function of the strongly reduced 'eye region' as a photoreceptor has not been proven. The taxonomy and the ranges of some genera are still subject to intensive research (e.g. Zaballos & Ruiz-Tapiador 1998), therefore the marked limits seem to be preliminary.

vegetation of nearly any kind (Jeannel 1942, Lindroth 1972, 1985, 1986). Erwin (1979: 591) characterises the members of this tribe as "tropically and warm-temperate adapted in all regions". If the ancestor of *Galiciotyphlotes* had a comparable temperature requirement, it may have arrived in Spain during a warmer climatic period (e.g. Pliocene or earlier). An adaptation to the changing climatic conditions (e.g. in the glacial period) has to be postulated (like for the Central African species *Typhlonestra elgonensis*, which lives in the alpine zone with *Senecio*-woodlands at about 3500 m at the Mount Elgon, and for the *Perigonillus* species exclusively found in higher altitudes of east African mountains). Therefore it may be supposed that the new genus is an ancient relict of a much wider distribution of the Perigonini.

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A revaluation of *Loeffleria globicollis* Mandl from Borneo

(Insecta, Coleoptera, Carabidae, Psydrinae)

Martin Baehr & Wolfgang Lorenz

Baehr, M. & W. Lorenz (1999): A revaluation of *Loeffleria globicollis* Mandl from Borneo (Insecta, Coleoptera, Carabidae, Psydrinae). – Spixiana **22/3:** 263-267

The genus *Loeffleria* Mandl, 1969 from Mt. Kinabalu, Sabah, northeastern Borneo, is revaluated, the single species *L. globicollis* Mandl is redescribed and male and female genitalia are described and figured for the first time. The genus *Loeffleria*, originally arranged within Broscinae by the describer, is obviously synonymic with the psydrine genus *Mecyclothorax* Sharp. Hence, *Loeffleria* is herewith stated to be a junior synonym of *Mecyclothorax* Sharp. The presence of setiferous punctures on 3rd and 5th elytral intervals suggests that the Bornean species is most closely related to the New Guinean species *M. toxopei* Darlington.

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In 1969 Mandl described the new genus *Loeffleria* from a single specimen that was collected at about 3500 m altitude on Mt. Kinabalu in Sabah, northeastern Borneo. Mandl gave an extensive description and discussion. He included the new genus in the tribe Broscini, but, apart from some broscine genera, he compared it also with the genus *Oopterus* that, according to Mandl, "was only recorded in Tasmania" (Mandl 1969, p. 53). Although almost all of this statement as well as a major part of the description is wrong, the new genus was included under Broscini without any commentary by Stork (1986) in his checklist of the Carabidae of Borneo.

Unfortunately, Mandl failed to recognize two important characters on his single specimen: namely the presence of a seta in the mandibular scrobe, and the presence of setiferous punctures not only on the 3rd but also on the 5th interval. Already the observed absence of a mandibular seta in the single examined specimen should have prevented Mandl from arranging it within Broscini; though apparently this arrangement had been made exclusively by virtue of the convex surface and the rather circular shape of pronotum and elytra, because Mandl explicitly stated that his genus and species has two supraorbital setae, a pattern that does not normally occur in Broscini.

Although Mandl stated that "the new genus is between Broscini and Nomiini", he compared it with the genus *Oopterus* which actually belongs to Merizodini and, moreover, does not occur in Tasmania. Therefore, not only the description demonstrates a high degree of inaccuracy, but also the discussion reveals a lamentable ignorance about the systematics of the carabid tribes. Everybody who is just a bit familiar with the Indoaustralian carabid fauna immediately would have recognized the specimen as a species of the widespread Indoaustralian psydrine genus *Mecyclothorax* Sharp. This example of a catastrophic misinterpretation should prevent anybody being absolutely unfamiliar with the fauna of a certain faunal province to describe new genera from single specimens.

The synonymy of *Loeffleria* with *Mecyclothorax* was independently detected by both authors of this paper: by the first author while studying some specimens from the Museum Civico di Storia Naturale, Verona (MCSNV); by the second author while identifying material recently collected by Mr. Carsten

Brühl on Mt. Kinabalu (material in coll Lorenz, Tutzing – CLT and the working collection of M. Baehr, München – CBM). So we agreed to formally synonymize *Loeffleria* with *Mecyclothorax*, to redescribe the single species, and to describe and figure the male and female genitalia. This had not been done by Mandl, because the holotype was said by him to be a female.

Mecyclothorax is a genus of small psydrine ground beetles of characteristic shape that is widely distributed in the Indopacific region area from Java in the west to Hawaii and Tahiti in the east. To the south the range includes New Guinea, New Caledonia, Australia, and New Zealand. The genus is well known for its dispersal ability and for its diversity it has achieved on certain islands or island groups like Hawaii and Tahiti, although the many species occurring there have probably evolved from one stock or few stocks only that were introduced by rafting or by drifting by wind. The origin of the genus may have been in the southeastern part of Australia where the most plesiotypic species still exist.

Most of the Australian species, namely those related to *M. ambiguus* (Erichson) are still winged and the foundator species on Hawaii, Tahiti, Java, New Guinea, and also on Borneo should have had been winged, too, but today all species occuring on these islands or island groups apparently have lost their flying ability and thus possess reduced wings. This is probably due to the mountain-living habits of all these species. The same is true for the highly evolved, montane species occurring in northern Queensland (Moore 1984).

Although the species of *Mecyclothorax* are said to live in ground litter (Darlington 1962), some Australian species are at least partly semi-arboricolous and live on mossy tree trunks in subtropical and temperate rain forest (MB pers. obs.) and several species from Tahiti also have been beaten from foliage of shrubs and ferns (Perrault 1992).

In the northwestern part of its areal the genus has been so far rather rare in terms of species. 5 species are known from Java (Louwerens 1949, Darlington 1962) and at present 10 species are recorded from New Guinea (Darlington 1962, 1971, Baehr 1992, 1995, 1998), but none from Borneo, Sumatra, or elsewhere in the south Asian insular belt. In New Guinea two species groups exist, one consisting of smaller species with rather circular pronotum that live in rain forest of median altitude, the other inhabiting high mountains, where some species are known even from the highest tops (Baehr 1995). There is only one species that is similar to the Bornean species in having punctigerous 3rd and 5th intervals, namely *M. toxopei* Darlington from the top of Mt. Wilhelmina in central Irian Jaya.

Genus *Mecyclothorax* Sharp, 1903

Loeffleria Mandl, 1969: 53 (**new synonymy**); Stork 1986: 10 (the citation: Mandl 1964 is wrong!)

The genus *Mecyclothorax* is well known, and the type species of *Loeffleria* falls well into the boundaries of the genus. A diagnosis of the genus *Mecyclothorax* is not required.

Mecyclothorax globicollis (Mandl, 1969)

Figs 1, 2

Loeffleria globicollis Mandl, 1969: 54 (**comb. nov.**); Stork 1986: 10.

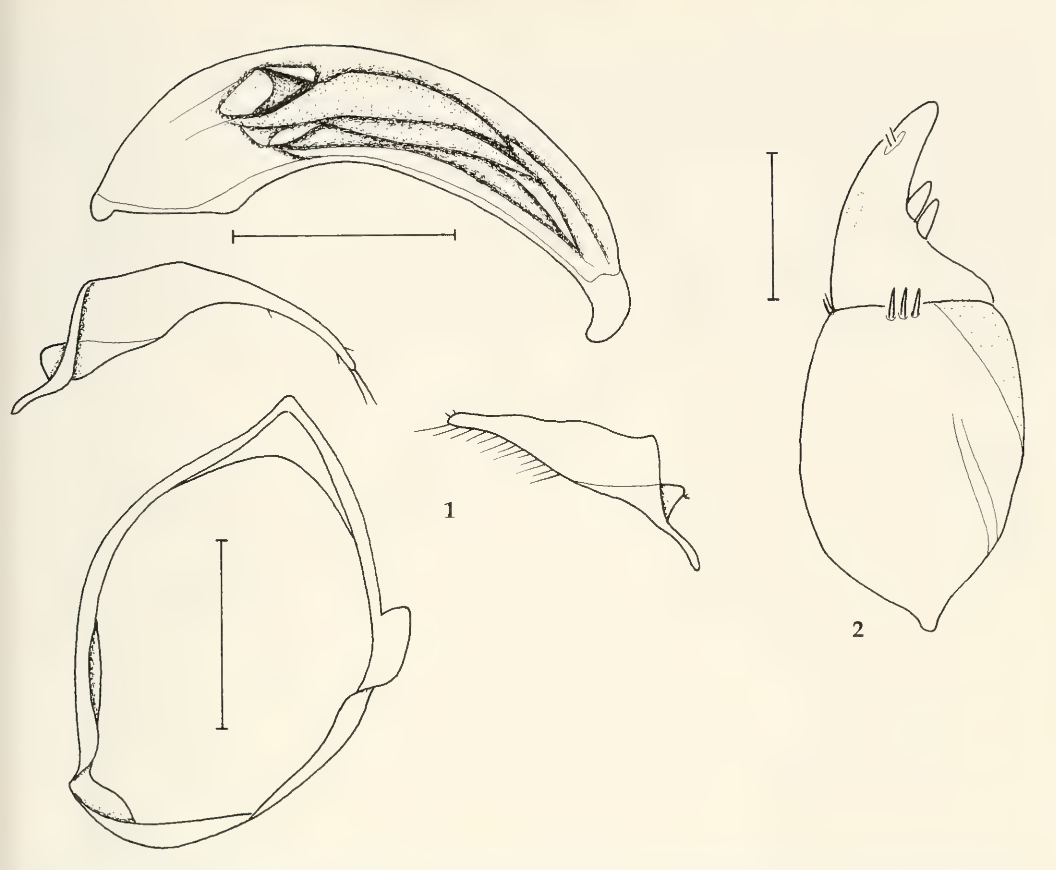
Diagnosis. Easily distinguished from all Javan, New Guinean, and Australian species, except for *M. toxopei* Darlington from Irian Jaya, by presence of setiferous punctures on 3rd and 5th intervals. The latter species mainly differs in the barely punctate and at the same time much less abbreviated striae of the elytra.

Contrary to the original description the species has a well developed seta in the mandibular scrobe – as usual in *Mecyclothorax* and generally in Psydrinae.

Redescription

Measurements. Length: 4.8-5.7 mm; width: 2.15-2.5 mm. Ratios. Width head/prothorax: 0.69-0.72; width/length of prothorax: 1.24-1.25; width base/apex of prothorax: 0.95-0.98; with elytra/prothorax: 1.62-1.65; length/width of elytra: 1.39-1.43.

Colour. Almost black, labrum, mandibles, palpi, antennae, and legs more or less dark reddish, basal antennomeres slightly lighter. Lower surface black, pronotal and elytral epipleurae reddish.



Figs 1,2. *Mecyclothorax globicollis* (Mandl). **1.** ♂ genitalia: aedeagus, left side; parameres; genital ring. Scales: 0.5 mm. **2.** ♀ stylomere 2 and base of stylomere 1. Scale: 0.1 mm.

Head. Rather narrow in relation to prothorax. Eyes comparatively large though depressed, orbits moderate, obliquely convex, almost ⅓ of length of eye. Clypeal suture well impressed. Frontal furrows slightly sinuate, very oblique, deep, ending shortly behind anterior supraocular seta. Labrum transverse, truncate, 6-setose. Mandibles moderately elongate, apex rather suddenly incurved, with setiferous puncture in scrobe. Mentum with distinct, apically rounded tooth. Antenna short, barely surpassing posterior border of pronotum, median antennomeres c. 1.5 × as long as wide. Posterior supraorbital seta situated well behind posterior border of eye. Frons convex or with very shallow, oblong median groove. Surface impunctate, with very superficial remnants of isodiametric microreticulation, glossy.

Pronotum. Large, wide, circular, considerably wider than long, in middle rather depressed, laterally evenly curved, without any excision in front of the basal angles. Widest diameter slightly in front of middle. Base slightly narrower than apex. Apex straight, apical angles not projecting, obtusely rounded. Base slightly convex, laterally very oblique. Basal angles perceptible, very small and obtuse. Marginal channel narrow throughout, barely widened near basal angles, base and apex not margined. V-shaped anterior sulcus very shallow, in middle barely perceptible. Median line barely impressed, anteriorly slightly, posteriorly much abbreviated, near base deepedend to a longitudinal groove. Basal grooves shallow, linear, slightly curved. Basal area not explanate, on same level with disk, impunctate. Anterior marginal seta situated slightly in front of middle, slightly removed from lateral margin, posterior marginal situated immediately at basal angle. Surface impunctate, microreticulation absent on disk, very weak and superficial along lateral margins, surface highly glossy.

Elytra. Short and wide, egg-shaped, dorsally markedly convex, widest diameter at or slightly behind middle. Shoulders almost regularly rounded off, lateral margin evenly curved. Basal margin strong, transversal, barely sinuate, connected to scutellary striole. Elytra quadristriate, though 4th stria

varying in distinctness. Striae including sutural stria much abbreviated at shoulder, all striae except for sutural stria also much abbreviated at apex. Three inner striae at least in basal half fairly impressed, intervals perceptibly convex. Striae coarsely punctate, 4th stria not or but slightly impressed, in some specimens considerably less coarsely punctate than inner striae. Outer striae absent or at least barely indicated. Scutellary striole fairly elongate, situated mediad of 1st interval, consisting of 4-5 coarse punctures. Marginal channel narrow. 3rd and 5th intervals with 3-5 setiferous punctures each in centre of interval, anterior puncture commonly situated close to base. Punctures rather conspicuous, setae fairly elongate. Scutellar puncture and seta at apex of sutural stria, though quite isolated. Near apex with a setiferous puncture at end of 2nd stria. Marginal pores fairly conspicuous, about 15 in a row that is barely interrupted in middle. Intervals impunctate, without any traces of microreticulation. Surface highly glossy, though not iridescent. Inner wings absent.

Lower surface. Impunctate. Metepisternum slightly longer than wide. Sternum VII in male bisetose, in female quadrisetose.

Legs. Without striking features. Three basal tarsomeres of male anterior tarsus expanded and squamose.

Male genitalia. Genital ring very wide, markedly asymmetric, with conspicuously diagonal basal rim. Aedeagus moderately elongate, lower surface rather straight, only towards apex suddenly curved. Apex rather compressed, slightly falciform, strongly sclerotized. Orifice mainly situated on right side. Internal sac with a large fold in apical half, and with a sclerotized furciform sclerite on upper side in posterior half. Right paramere rather elongate, with elongate, rather narrow, straight apex; lower margin with c. 12-15 elongate setae, upper margin near apex with 1-2 very short setae. Left paramere longer, with narrow and elongate, markedly curved apex that bears two elongate apical setae and 0-1 very short setae on upper rim and 1-2 short setae on lower rim.

Female genitalia. Both stylomeres short. 1st stylomere with three larger dentiform setae on lower margin and 2 fine short setae on median margin. Stylomere 1 with rather short, obtuse apex, with 2 large ventral ensiform setae, one large dorsal ensiform seta situated rather basally, and 2 very short nematiform setae originating from a groove near apex.

Variation. Apart from some extraordinary small specimens rather little variation noted.

Distribution. Mt. Kinabalu, Sabah, northeastern Borneo. Known only from this mountain top.

Collecting circumstances. Those of the holotype largely unknown. Most additional specimens have been collected between 3.500 m and 4.100 m, respectively. The latter altitude virtually matches the highest point of the summit of Mt. Kinabalu. One extraordinary small specimen, however, was collected at 2.800 m only. It is uncertain so far, whether this is evidence of size differences between populations living in different altitudes or whether the single specimen is only an extraordinary small specimen. The specimens collected by C. Brühl were captured on moist ground under slabs of granite on the summit plateau.

Material. 2♂♂, Mt. Kinabalu, vetta m. 4100, 10 Agosto 1972, Rosetto legit (MCSNV); 1♀, Kinabalu, Sabah, Borneo, m. 3500, Rif. New Hut, 9. Agosto 72, Rosetto legit (MCSNV); 2♂♂, 4♀♀, MALAYSIA, Sabah, Kinabalu NP. Granite Plateau, 3850m, 13.9.95, Leg. Brühl (CBM, CLT, ZSM); 2♀♀, Borneo, Sabah, 7.9.78, Mt. Kinabalu at 3900m, 116°33'E, 6°04'N, leg. Bogenberger (CLT); 1♂, Borneo, Sabah, 12.9.78, Mt. Kinabalu at 2800m, 116°33'E, 6°04'N, leg. Bogenberger (CLT).

Remarks. This is the first species of the genus *Mecyclothorax* recorded from the island of Borneo. Since several species of the genus occur on Java and New Guinea, respectively, this discovery was not too unexpected. Perhaps, additional species may occur on other mountains in central and southern parts of Borneo.

According to shape and structure of pronotum and elytra, the most similar species is *M. toxopei* Darlington from the top of Mt. Wilhelmina in central Irian Jaya, New Guinea. Provided, the multiplied number of elytra setae is an apomorphic character state – which is rather probable, because the apparently most plesiotypic species of the genus which occur in Australia bear two setiferous punctures on the 3rd interval only – then *M. toxopei* Darlington actually would be the nearest relative of *M. globicollis*. This New Guinean species likewise occurs at the very high altitude of about 4.200 m. Unfortunately, the male genitalia of *M. toxopei* are still unknown. The male genitalia of *M. globicollis*, however, are quite similar to some of the New Guinean species recently described by Baehr (1995, 1998).

At any rate, the distribution pattern of the genus in the northwestern part of its range is still very fragmentated and certainly we should expect additional species on high mountains in western Irian Jaya, on the larger islands of the Moluccas, and perhaps even on Sumatra. The distribution pattern in this part of the range rather seems to be caused by mountain hopping on very high mountains.

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32. Danner, F., U. Eitschberger & B. Surholt: Die Schwärmer der westlichen Palaearktis. Bausteine zu einer Revision (Lepidoptera: Sphingidae). – Herbipoliana, Buchreihe zur Lepidopterologie, Band 4/1 (Textband), 1998: 368 S., 90 Verbreitungskarten, 185 Faksimiledrucke von Erstbeschreibungen. Band 4/2 (Tafelband), 1998: 720 S., 122 Farbtafeln, 449 Schwarzweiß-Tafeln, hardback. ISBN 3-923807-03-1

Sicherlich fragen sich viele Lepidopterologen, warum es in aller Welt nach den umfangreichen Publikationen von d'Abrera (1986) über die "Sphingidae Mundi" und von Pittaway (1993) über die "Hawkmoths [=Schwärmer] of the Western Palearctic" noch nötig war, ein weiteres "Monumentalwerk" über die Schwärmer der westlichen Palaearktis herauszugeben. Zugegebenermaßen war dies auch dem Rezensenten nicht einsichtig, bevor er das zweibändige Werk sah.

Bei der Lektüre dieser unlängst erschienen Bücher jedoch wird schnell klar, worin die unzweifelhaften Stärken und der besondere Wert der Publikation liegen: Da besticht der Mut der Autoren, vorgegebene Schemata für Monographien zu verlassen und innovative Wege zu beschreiten, z.B. indem sie für jedes Taxon der Art- und Gattungsgruppe ein vollständiges Faksimile der Urbeschreibung abbilden. Auch wenn dies das Schriftbild des Textbandes etwas unruhig macht, so ist es jedoch von unschätzbarem Wert, daß die Autoren ihren Lesern ein für allemal wochen- und monatelanges Bibliothekstudium ersparen. Es ist ja hochgradig ineffizient, daß in der Lepidopterologie dieselben Tätigkeiten, wie z.B. eben das Quellenstudium, oft hundertfach von den verschiedenen Bearbeitern wiederholt werden. Hoffentlich leitet dieser erste Schritt einer Sammlung und Verfügbarmachung von Urbeschreibungs-Faksimili eine Entwicklung ein, die dazu führen könnte, einmal alle Originalzitate in digitaler Form auf dem Internet abrufbar zu machen!

Im Textteil werden 168 Arten und Unterarten behandelt. Zum Vergleich: Pittaway (1993) führt nur 85 Taxa auf. Die Tatsache, daß im Umfeld der Entstehung des Buches fast alle Arten gezüchtet wurden, erlaubt eine fachkompetente Beschreibung der Präimaginalstadien und Zuchten. Die Autoren beschreiben zudem zehn neue Arten und Unterarten, des weiteren werden viele taxonomische Änderungen vorgenommen, die jedoch leider nirgends in einer Liste zusammenfaßt und explizit als solche vorgestellt werden.

Schwerpunkt des Werkes ist zweifellos die schier nicht enden wollende Fülle an Abbildungen im Tafelband: Der Leser findet sehr schöne Falterabbildungen auf 42 Farbtafeln, darunter viele abgebildete Typenexemplare, brilliante Raupenfotos (meist alle Häutungsstadien!) auf 80 Farbtafeln, fast 2000 Genitalfotographien und über 1200 rasterelektronenmikroskopische Aufnahmen von systematisch bedeutsamen Details von Eiern, Raupen und Puppen, letzteres ebenfalls – zumindest in diesem Umfang – ein innovatives Element. Die Variabilität aller Merkmale in Zeichnung und Struktur (auch im Genitalapparat) wird ausführlich dokumentiert.

Den Autoren sei gedankt, daß sie soviel Mut zu Innovation hatten und ein überwältigendes Archiv an Bildmaterial zur Verfügung stellen, wie dies in dieser Fülle bei Veröffentlichungen über Sphingidae noch nie geschehen ist. Das Konzept, möglichst nur Primärdaten (Primärliteratur und Typenexemplare) zu verwenden, unterscheidet das Werk in positiver Weise von vielen bisherigen einschlägigen Publikationen. Mit der Konzentration auf die Präimaginalstadien und die Genitalmorphologie sind die Autoren hierbei bewußt "auf Lücke gegangen" und haben somit nicht nur eine Existenzberechtigung für dieses weitere Buch über palaearktische Schwärmer geschaffen, sondern werden damit sicherlich auch eine große Leserschaft gewinnen.

A. Hausmann

33. Sala, G.: I lepidotteri diurni del comprensorio Gardesano. SEM editrice, Saló (BS), 1996. 160 S., 32 Farbtafeln mit 684 abgebildeten Faltern, 171 Verbreitungskarten, paperback.

Die Tagfalterfauna des Gardaseegebietes hat wegen ihrer übergroßen Reichhaltigkeit wohl jeden Entomologen begeistert, der sich dort einmal aufhielt. G. Sala, ein bekannter italienischer Tagfalterspezialist, legt nun eine Tagfalter-Lokalfauna der 171 Tagfalterarten des Gardaseegebietes vor. Das nicht gerade billige Buch ist lobenswerterweise durchgehend zweisprachig in italienischer und englischer Sprache verfaßt. Die übersichtlichen, recht kurzen Texte stellen die Taxa mit ihrem wissenschaftlichen Artnamen, der Typenlokalität, faunistischen und systematischen Anmerkungen sowie Gefährdung und Naturschutz vor. Ob es wirklich nötig war, noch eine weitere Unterart des Apollofalters zu beschreiben, erscheint angesichts der Tatsache zweifelhaft, daß von manchen Autoren für diese Art schon mehr als 250 Taxa auf subspezifischem Niveau postuliert werden. Alle abgebildeten Falter sind in einer Legende mit genauen Funddaten, d.h. Fundort, Datum und Sammler gekennzeichnet. Allerdings sind viele Aufnahmen schlecht belichtet, nicht farbecht oder unscharf. Dies gilt leider auch für die für das Titelfoto ausgewählten stark abgeflogenen (Schwarzen) Apollofalter. Die instruktiven Verbreitungs-Reliefkarten sind mit eingeblendeten Artnamen versehen und daher sehr benutzerfreundlich.

A. Hausmann

34. Viette, P.: Lépidoptères Hétérocères de la Réunion (=Bourbon). – Soc. réun. Amis Mus., Saint Denis, 1996. 117 S., 32 Genitalabb., 12 Farbfotos auf 4 Farbtafeln, paperback.

Der Autor der vorliegenden Faunenliste von Heteroceren ("Nachtfalter") der Insel Réunion im Indischen Ozean machte in der zweiten Hälfte dieses Jahrhunderts vor allem durch seine Expeditionen nach Madagascar und die diesbezüglichen Publikationen auf sich aufmerksam. In dem nun erschienenen Büchlein werden 443 "Nachtfalter"-Arten behandelt (Macro- und Microlepidoptera), lediglich die Tagfalter (Rhopalocera) blieben leider ausgeklammert. Jede Art wird nach folgendem Schema vorgestellt: Vollständiges Originalzitat, Synonyme, jeweils mit Typenfundort und Typenverbleib, Verbreitung. Das Bild wird bei vielen Arten durch Anmerkungen taxonomischer Art, bzw. durch Hinweise auf Häufigkeit oder Raupenfutterpflanzen abgerundet. In einem Anhang werden 12 Arten als neu beschrieben. Das Buch ist ein wertvolles Arbeitsmittel für alle, die sich für die Lepidopterenfauna der Aethiopis und der madagassischen Region interessieren. Es kann von der Société Muséum d'Histoire naturelle, 1, rue Poivre, 97400 Saint-Denis bezogen werden. A. Hausmann

35. Fibiger, M.: Noctuidae Europeae, Vol. 3: Noctuinae III. – Entomological press, SorÝ, 1997. 418 S., 106 Textabb., 534 Genitalabb., Leinen.

Auch dieser mittlerweile fünfte erschienene Band der Buchreihe über europäische Eulenfalter (Noctuidae) ist ganz ausgezeichnet gelungen. Wohl mehr noch als die beiden ersten Bände über die Unterfamilie der "Erdeulen" (Noctuinae) ist der dritte Band **die** unentbehrliche Arbeitsgrundlage für die Determination der europäischen Vertreter dieser Unterfamilie. Anders als in den Bänden 6 und 7 (Noctuidae, Cuculliinae), wo die Genitalzeichnungen in den betreffenden Textband eingebunden sind, zog es der Autor – einer der renommiertesten europäischen Noctuiden-Spezialisten – hier vor, die systematisch bedeutsamen Differentialmerkmale in einem gesonderten Band und auf photographischem Wege darzustellen. Dies stellt eine interessante neue Variante dar, die dem Benutzer sicherlich eine Reihe von Vorteilen bietet, allerdings jedoch auch den Nachteil, für die jeweilige Art stets zwei Bände konsultieren zu müssen. Im Textteil findet der Leser vor allem Beschreibungen differentialdiagnostisch wichtiger Merkmale im Genitalapparat und taxonomische Hinweise zu den Gattungen. Die fotographisch dargestellten Genitalapparate (alle Arten ♂, ♀) im Bildteil sind von herausragender Qualität. Der Preis ist als angemessen zu bewerten, auch wenn die gesamte Buchreihe angesichts der vielen Einzelbände für so manchen "normalverdienenden" Entomologen unerschwinglich erscheinen mag. A. Hausmann

36. Ebert, G. (Hrsg.): Die Schmetterlinge Baden-Württembergs, Band 5, Nachtfalter III. – Verlag Eugen Ulmer, Stuttgart, 1997. 575 S., 400 Farbfotos, 360 Diagramme und Zeichnungen, 133 Verbreitungskarten, Leinen.

Die von G. Ebert herausgegebene und von einem Autorenkollektiv realisierte Buchreihe wurde schon mehrfach in Rezensionen als der Meilenstein schlechthin in der Europäischen Faunistik herausgestellt und gewürdigt. Dem ist auch angesichts des vorliegenden Bandes 5 eigentlich nichts hinzuzufügen. Neben der wie immer exzellenten Bebilderung überzeugt der Band über die Schmetterlingsfamilien Sesiidae, Arctiidae und Noctuidae (1) vor allem durch die redaktionelle Leistung, die bei einem Autorenkollegium von immerhin 17 Lepidopterologen ein exakt dem Standard der anderen Bände entsprechendes Resultat ermöglichte. Ceterum censeo: Ein "Muß" für jeden Entomologen! A. Hausmann

37. Steiner, A.: Nachtfalter IV. in: Ebert, G. (Hrsg.): Die Schmetterlinge Baden-Württembergs, Band 6. – Verlag Eugen Ulmer, Stuttgart, 1997. 622 S., 512 Farbfotos, 433 Diagramme und Zeichnungen, 187 Verbreitungskarten, Leinen.

Siehe Bemerkungen zu Band 5. Der immense Fleiß von Autor und Herausgeber, sowie die gelungene Koordination von unzähligen Mitarbeitern sind wahrlich beeindruckend und kann nicht genügend gewürdigt werden. Die beiden vorliegenden Bände sind als extrem preisgünstig zu bezeichnen! Ceterum censeo: Ein "Muß" für jeden Entomologen! A. Hausmann

38. Dirickx, H. G.: Catalogue Synonymique et Géographique des Syrphidae (Diptera) de la Région Afrotropicale. – Muséum d'histoire naturelle, Case postale 6434, CH 1211, Genève 6, Suisse, 1998. 187 pp., 73 Verbr.-Karten. ISBN 2-88139-005-6. (brosch.)

Eine gelungene Fleißarbeit in Sachen Literaturrecherche, werden doch die über 500 afrotropischen Schwebfliegenarten seit dem Katalog von 1980 (Smith & Vockeroth in: Crosskey et al.: Catalogue of the Diptera of the Afrotropical Region) nomenklatorisch überarbeitet. Der besondere Vorteil des Werkes liegt in der fast lückenlosen Auflistung der Literaturzitate bei jeder einzelnen Art. Auch für die Verbreitung werden zusätzliche Details präsentiert, für die der Dipteren-Katalog von 1980 nicht ausführlich genug ist.

Das Buch ist ausschließlich in französischer Sprache verfaßt. Es ist in vier Teile gegliedert: Einleitung, Artenliste, Verbreitungskarten und Bibliographie. In der Artenliste ist jede Art mit ihren Synonymen sowie allen Literaturstellen und mit einem Absatz zur Verbreitung in der Region eingetragen. Bei vielen Arten ist dabei der locus typicus angegeben. Der Verbleib des Holotypus fehlt auch hier. Bei 73 Arten wird die Verbreitung durch Verbreitungskarten dargestellt. Diese sind allerdings etwas dürftig ausgefallen; in einem Umriß von Afrika sind als Unterteilung lediglich die vier größten Flüsse eingezeichnet, Ländergrenzen oder sonstige Strukturen fehlen. Ein stattliches Literaturverzeichnis beschließt das Buch. Infolge des Fehlens eines Registers findet man die Bearbeitung einiger Taxa nur durch längeres Blättern und Suchen, und somit ist das Werk eher etwas für die Spezialisten unter den Dipterologen und für die sachbezogenen Museen und Institute. W. Schacht

39. Kilias, R. (Hrsg.): Lexikon Marine Muscheln und Schnecken. Verlag Eugen Ulmer, Stuttgart, 1997. 340 S., 385 Farbf. u. 148 Zeichn. ISBN 3-8001-7332-8.

Das vorliegende, von einem Autorenkollektiv abgefaßte Lexikon versucht nach den Worten des Herausgebers, "in alphabetischer Reihenfolge viel Wissen entsprechend des heutigen Kenntnisstandes über die beiden umfangreichsten Molluskenklassen [Schnecken und Muscheln] zusammenzutragen". Gerade dies ist aber leider nur in Ansätzen geglückt.

Die gleich am Beginn des Lexikons angeführte Systematik der Mollusca muß schlicht und auch in bezug auf den Redaktionsschluß 1995 als "veraltet" angesehen werden, wobei insbesondere basale Gastropoda und die Cephalopoda negativ auffallen. Darüber hinaus fehlen sämtliche Daten der Ultrastrukturforschung, der Neuro-Immunzytochemie und der molekularen Verwandtschaftsanalyse. Auch das Konzept des Lexikons ist fragwürdig: einerseits hat es den Charakter eines taxonomischen Nachschlagewerkes, das selbst Gattungssynonyme umfaßt. Im Detail ist auch hier sehr viel seit Jahren überholt. Auch ist es zweifelhaft, ob die alphabetische Anordnung hier wirklich sinnvoll ist (hohe Redundanz); eine solide phylogenetische Klassifikation mit Index ist hier weitaus brauchbarer. Andererseits finden sich auch Paragraphen über allgemeine Strukturen und Termini, die wiederum häufig nicht dem aktuellen Kenntnisstand entsprechen.

Positiv zu vermerken sind die durchwegs qualitativ hochwertigen Farbfototafeln, welche nicht nur die Tiere bzw. Schalen zeigen, sondern auch sehr schöne Abbildungen von conchologischem Kulturgut umfassen, m.E. der gelungenste Teil des Lexikons. G. Haszprunar

40. Fränzle, Müller, Schröder (Hrsg.): Handbuch der Umweltwissenschaften – Grundlagen und Anwendungen der Ökosystemforschung. – ecomed-Verlagsgesellschaft, 1997, Loseblattsammlung. ISBN 3-609-73940-1.

Die Herausgeber, tätig am Projektzentrum für Ökosystemforschung der Universität Kiel, haben mit dieser Sammlung verschiedener Einsichten in das komplexe System der Wechselbeziehungen von Mensch und Umwelt und auch Natur vorgestellt. Nur das Verständnis für die Gesamtheit des Systems, das die Analyse auf Grund ihres Komponentenreichtums so schwierig macht, soll hier vermittelt werden. Traditionelle Einzeldisziplinen werden darum in ihren theoretischen Ansätzen und vielfach organismischen Aussagen gebündelt dokumentiert. Ebenso werden Randbereiche wie Rechts- und Sozialwissenschaftsbelange einbezogen. So werden hier ganzheitlich einige exemplarische Problembereiche synökologisch wie 'sinnökonomisch' zusammengefaßt, was die Grundlage auch für Schutzmaßnahmen darstellen soll. Die Analyse bleibt jedoch auch hier wie bei vergleichbaren Studien auf der Strecke, d.h. Ökosystemforschung kann weiterhin nur ein grobes Muster vorgeben, das an der Individualität des Lebensraumes und vor allem der Mitglieder des Arteninventars scheitern muß. Dennoch ist diese Sammlung von Fragestellungen und Hinweisen zur Grobanalyse ein interessantes Studienwerk, das für Ökologen, Agrarwissenschaftler, Geowissenschaftler, Chemiker, Umweltbehörden sowie Rechtsabteilungen im umweltbezogenen Management gleichermaßen einige Aspekte herausstellt.

E.-G. Burmeister

41. Barlow, T. & W. Wisniewski: Kosmos NaturReiseführer Südliches Afrika – Südafrika, Namibia, Botswana – Tiere und Pflanzen entdecken. – Kosmos Verlags-GmbH & Co. 1998, 286 S. ISBN 3-440-07665-2

Nach Jahrzehnten der touristischen Abstinenz sind die Länder Südafrikas seit einiger Zeit zum Reisemagneten geworden. Dieser Lockung des Südzipfels Afrikas trägt der vorliegende Reiseführer Rechnung. So werden neben der neueren Geschichte, die Wirtschaft, Geographie und Geologie sowie ein Einstieg in Flora und Fauna in 'Streiflichtern' behandelt. Die Historie und die Grundlagen des Völkergemisches kommen besonders im Hinblick auf Namibia und Botswana leider etwas zu kurz. Es schließt sich die touristische Aufarbeitung Südafrikas an, wobei vorzugsweise die großen Städte und die bekannten landschaftlichen Höhepunkte vorgestellt werden. Bedauerlicherweise fehlen hier Hinweise zu 'Abwegen', die besonders den Individualreisenden ansprechen. Die Routenbeschreibungen auch in den Nationalparks sind informativ dokumentiert. Demgegenüber sind Namibia und Botswana, als Drei-Länder-Reise ausgewiesen, nur abrißhaft abgehandelt, wobei auch hier nur wenige Landstriche und Schutzgebiete exemplarisch herausgestellt werden. Diesen Reiseinformationen schließt sich der besonders reich bebilderte Bestimmungsteil an, den die Großsäugetiere und Vögel Südafrikas dominieren. Die 330 Tiere und Pflanzen werden weitgehend durch hervorragende Fotos dargestellt. Ein kurzer Begleittext, der Merkmale, Vorkommen und Lebensweise beschreibt, gibt zusätzliche Informationen, ersetzt jedoch nicht ein Bestimmungsbuch, da die Fülle an Arten den Rahmen sprengen würde. Bedauerlich ist das Fehlen einer Vielzahl auffälliger Kleintiere dieses Südzipfels Afrikas, auch die Pflanzenauswahl ist eher bescheiden. Ein Mehr an Arten würde dann den zu touristisch ausgerichteten Teil einengen, für den es andere gute Reiseführer gibt. Die Kombination von Reiseinformationen und Fauna + Flora ist sicher interessant und kann auch dem zoo-botanischen Laien den Einblick in die Artenfülle ermöglichen. Die Chance, dem Reisenden mehr Information über Flora und Fauna in die Hand zu geben, könnte möglicherweise noch etwas besser genutzt werden.

E.-G. Burmeister

42. Wachmann, E. & C. Saure: Netzflügler, Schlamm und Kamelhalsfliegen – Beobachtung, Lebensweise. – Naturbuch Verlag 1997, 159 Seiten. ISBN 3-89440-222-9

In der sehr erfolgreichen und ansprechenden Reihe des Naturbuch Verlages wird hier eine Insektengruppe vorgestellt, die weniger auffällt, sieht man von den Schmetterlingshaften ab, jedoch allgegenwärtig ist. So werden hier nach dem üblichen Schema die einzelnen Arten durch Beschreibung und hervorragende Fotos vorgestellt. Verständlicherweise sind die Arten so nicht determinierbar, auch die Diagnosetabelle führt nur bis zu den Familien. Dennoch lassen sich die abgebildeten Netzflügler den einzelnen Gruppen zuordnen und die Abbildungen zeigen die Unterschiede an den Einzelindividuen. Neben den häufigeren heimischen Arten sind auch auffällige Tiere des Mittelmeerraumes zu finden, da diese dem Reisenden in den Urlaubsländern immer wieder auffallen. Die Angaben zum Bau und zur Lebensweise der Larven und erwachsenen geflügelten Tiere dieser bemerkenswerten Insektengruppe runden das Bild dieses gelungenen Büchleins ab.

E.-G. Burmeister

43. Irmler, U., Müller, K. & J. Eigner (Hrsg.): Das Dosenmoor – Ökologie eines regenerierenden Hochmoores. – Faunistisch-ökologische Arbeitsgemeinschaft, Selbstverlag, 1998, 283 S. ISBN 3-00-003517-6

Die Moore Norddeutschlands unterlagen lange Zeit extremer Nutzung, wobei der vielfach maschinell abgebaute Torf als Brennmaterial sowie als Gartendünger verwendet wurde. Ehemals ausgedehnte Hochmnoorflächen sind fast vollständig verschwunden. Auch das hier vorgestellte Dosenmoor, inzwischen eines der besterhaltensten Hochmoorareale Schleswig-Holsteins, war den Meliorierungen, die der Entwässerung folgen, unterworfen. Seit 1978 wird jedoch ein Rückbau, d.h. eine Regeneration auf verschiedenen Wegen, versucht, die bereits in großen Teilen eingesetzt hat. Da ein Hochmoor einer ständigen Sukzession unterliegt, kann der Ausgangszustand nicht erhalten werden, aber ein wachsendes Hochmoor, das in Jahrhunderten bis Jahrtausenden in einen oberflächlich trockenfallenden Moorwald übergehen wird, wieder präsentieren zu können, gehört heute zu den vornehmsten Pflichten des Naturschutzes. Dabei werden sich Tier- und Pflanzenarten wieder erholen, wieder ansiedeln, die andernorts im Defizit leben. Auch wenn die Erstbesiedlung nach einigen Jahren nachläßt, d.h. die Artenzahlen zurückgehen, erhöht sich die Qiualität der Biozönose und damit des Lebensraumes. In zahlreichen Einzelkapiteln wird in der vorliegenden Dokumentationsstudie von namhaften Wissenschaftlern die Auswirkungen der Regenerierungsmaßnahmen verfolgt. Techniken zur Wiedervernässung und Wasserrückführung, nur nährstoffarmes Regenwasser ist verwendbar, Landschaftsentwicklung, vergleichende Geschichte, Klima und Hydrologie, Pflanzen- und Tierwelt sowie die Einflußnahme der Renaturierungsmaßnahmen werden behandelt. Die dabei erhaltenen Detaildaten können richtungsweisend für Vergleichsstudien in anderen Moorgebieten sein. Den besonders informativen Kapiteln ist jeweils ein umfangreiches Literaturverzeichnis angegliedert. Ein Buch, das dem Moorfreund, Moorforscher, Faunisten wie Floristen und Tätigem im behördlichen wie verbandsgebundenem Naturschutz ein wichtiges Hilfsmittel sein wird.

E.-G. Burmeister

44. Heckman, C. W.: The Pantanal of Pocone' – Biota and Ecology in the Northern Section of the World's Largest Pristine Wetland. – Monographie Biologicae Vol. 77; Kluwer Academic Publishers, Dordrecht/Boston/London, 1998, 622 S. ISBN 0-7923-4963-X

Das Pantanal in Brasilien, eines der größten saisonalen Überschwemmungsgebiete der Erde, beherbergt eine eigene Lebensgemeinschaft und ist gleichzeitig Refugium für zahllose Pflanzen und Tiere. Doch auch dieser Großlebensraum ist bedroht, da die Fläche zwischen 80- und 250-Tausend Quadratkilometern Begehrlichkeiten der Landnutzung weckt. Trockenlegungstendenzen sind bereits an vielen Stellen zu spüren. Zudem verändern randliche Einflüsse von Siedlungen und Tage-Bergbau, Vieh- und Landwirtschaft die Struktur dieses einmaligen Gebietes. Der Autor hat versucht in dieser umfassenden Dokumentation die Basisdaten zur Geographie, Geologie, Klima, Hydrologie und Wasserchemismus zusammenzutragen. Die benutzten Quellen sind in dem besonders umfangreichen Literaturverzeichnis aufgeführt. Dieser übersichtlichen Darstellung folgen die umfangreichen Kapitel zur Flora und Fauna, wobei hier die systematischen Gruppen nacheinander von den Cyanobakterien bis zu den einkeimblättrigen Blütenpflanzen und von den Protozoa bis zu den Säugetieren behandelt werden. Dabei werden die besonderen Floren- und Faunenelemente vorgestellt, die ebenfalls in dem ausgedehnten Sachregister aufgeführt sind. Diesen Beschreibungen des Arteninventars dieser ungeheuren Fläche folgt eine biozönotische Analyse, wobei die natürlichen Gesellschaften den anthropogen überformten gegenübergestellt werden. Die Dynamik sowohl der Überstauungsphasen und Trockenzeiten wie auch innerhalb der Besiedlungsgesellschaften werden hier vorgestellt. Zudem gilt ein besonderer Augenmerk der Einflußnahme des Menschen dem ein abschließendes Kapitel über den möglichen Schutz und die Erhaltung dieser einzigartigen Landschaft folgt. Für Ökologen und Biologen sowie Wasserbauern mit Schwerpunkt tropischer Bedingungen lassen sich hier wesentliche Anstöße finden, die manch anderes Projekt überdenkenswert erscheinen lassen.

E.-G. Burmeister

45. Gatter, W.: Birds of Liberia. – Aula Verlag, Wiesbaden, 1997. 320 S., geb., 4 Farbtaf., 107 Fotos (86 farbig), zahlr. Graphiken u. Verbreitungskarten. Format 19,3 × 25 cm. ISBN 3-89104-615-4.

Ein großer Wurf ist dem durch die Station Randecker Maar bekannten Zugvogelforscher Wulf Gatter gelungen: das wohl umfassendste Buch über die Vögel Liberias. Vorarbeiten dazu leistete Gatter schon durch die vorläufige kommentierte Checkliste der Vögel Liberias (1988). In englischer Sprache verfaßt gibt das buch einen kompletten Abriß über den heutigen Wissensstand liberianischer Vögel. Dabei ist es kein eigentlicher Feldführer. Man muß zumindest noch den "Field guide to birds of The Gambia and Senegal" mitschleppen. Hingegen sind 29 seltenere und endemische Vogelarten auf 4 exzellenten Tafeln von M. Woodcock gemalt, weitere 56 Arten farbig und bestimmbar fotografiert. Mit 27 klaren großformatigen Farbaufnahmen aller Habitate lebt man sich in Liberia ein.

Genau die Hälfte des Buches ist dem systematischen und kompletten, 600 Arten umfassenden Teil gewidmet, der ca. 12 Zeilen pro Art über Status und ausführlicher über Habitatansprüche und -präferenzen und den brutbiologischen Jahreszyklus ausführt, bei Meeresvögeln oder seltenen Zuggästen auch weniger. Die residenten Vögel bekommen alle (400) eine Verbreitungskarte beigesellt, die nach Brutbeleg oder Zug-/ Trockensaisonvorkommen aufschlüsselt.

Die einführenden Kapitel bieten exakte, durch Graphiken untermauerte Information über Topographie, Vegetationszonen, für Vögel wichtige Biotope, Hauptblütezeiten und Insektenflugzeiten sowie davon wie von den Regenzeiten abhängig, die Brutzeiten der Vögel. Ein Vorteil ist, daß der Autor als Forstmann nicht nur die meisten Baumarten dort kennt (Nahrungsökologie!), sondern auch den Fachblick für Strata und Feineinnischung der Vögel hat, was in den Kapiteln über Ökologie der Waldvögel Ausdruck findet. Er spricht – mitten im Regenwald – von "Baumriesen-Savanne" (canopy savanna), halten sich doch auf diesen Einzelbäumen wie über einem geschlossenen Baum- (oder Gras-)Meer nur bestimmte Vogelarten auf, die durch große Flugdistanzen, höhere Sozialität, Gemeinschaftsschlafen oder -brüten sowie durch laute Stimmen gekennzeichnet sind. Besonders spannend liest sich über die gemischten Vogelschwärme, deren er nicht weniger als 3700 beobachtete, und die daraus resultierende prozentuale Zusammensetzung (4 Graphiken) und komplette Vogelartenliste solcher mixed species flocks-Teilnehmer im Anhang, fein säuberlich nach Baumhöhenschichten geordnet.

Genaue Beobachtung ermöglichte z.B. die ökologische Nischentrennung je einer Art von Bülbüls der Gattung *Criniger*, die jeweils mehr senkrechte *(olivaceus)*, diagonale *(barbatus)* oder waagerechte *(calurus)* Habitatstrukturen ausnutzen. Mit diesen Detailinformationen wird eine Fülle von Material ausgebreitet, welches sich bereits wissenschaftlich mit ähnlichen Beobachtungen in Südamerika vergleichen ließe.

Die Krönung von W. Gatters 15-jähriger Forschertätigkeit in Liberias Wäldern kann ich nur bekräftigen mit dem Einbandtext: "Dieses Buch vermehrt beträchtlich unser Wissen über westafrikanische Vögel und kann modellhaft für weitere Studien in diesem Raum stehen."

T. Mischler

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The identity of *Varanus indicus*: Redefinition and description of a sibling species coexisting at the type locality

(Sauria, Varanidae, *Varanus indicus* group)

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Investigations of Pacific monitors lizards (*Varanus indicus* group, sensu Böhme et al. 1994) from Ambon (the type locality of *V. indicus*) revealed the sympatric existence of two different taxa. Because the holotype of *V. indicus* has to be regarded as lost (Brygoo 1987, Böhme et al. 1994, Sprackland 1994, 1997) the dark-tongued form with an irregularly light spotted dorsum in combination with the lack of a light temporal stripe herein is redefined as *V. indicus*, in accordance with the description of Daudin (1802) and with earlier concepts of *V. indicus*, thus serving the stability of zoological nomenclature, and a neotype is designated. The second form coexisting with *V. indicus* at Ambon and occuring furthermore on Seram, Buru, Obi, the Banda Islands and possibly also on New Guinea could not be referred to any of the other species of the *V. indicus* group known so far, nor to their available synonyms and is therefore described as a new species. *V. cerambonensis*, spec. nov. is characterized by the following character combination: a dark coloured dorsum with a banded pattern; the lack of blue pigmentation; a light temporal stripe; a light, unpatterned throat; a light coloured tongue with an ill-defined dark area on the upper side only in adults; a characteristic juvenile pattern consisting of dark, light-centered ocelli; low scale counts; only unilaterally differentiated paryphasmata on the outer genital organs that further bear more than 20 pointed tips, arranged in two rows at the apex of the inner, bigger hemibacula. We further comment on the systematic relationships and on life habits, habitat and distribution of both *V. indicus* and *V. cerambonensis*, spec. nov. For the first time we record *V. indicus* from Hermit Island (Papua New Guinea) and from the Japanese Bonin Islands.

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Introduction

Several new species of Pacific monitors (*Varanus indicus* group) have been discovered and/or resurrected in the past few years (Böhme et al. 1994, Böhme & Ziegler 1997, Harvey & Barker 1998, Ziegler, Böhme & Philipp 1999, Ziegler, Philipp & Böhme 1999), so that this clade within the subgenus *Euprepiosaurus* consists now of the following eight *Varanus* species:

caerulivirens Ziegler, Böhme & Philipp, 1999 (Halmahera, Moluccas);
doreanus (Meyer, 1874) (New Guinea and some offshore islands including the Aru Islands, North Australia);
finschi Böhme, Horn & Ziegler, 1994 (Bismarck Archipelago, New Guinea and Australia);
indicus (Daudin, 1802) (for distribution range see below);
jobiensis Ahl, 1932 (New Guinea and some offshore islands);
melinus Böhme & Ziegler, 1997 (some islands of the Sula, Banggai and Bowokan island groups: Lemm 1998, Ziegler & Böhme 1999, Bayless & Adragna 1999, Sprackland 1999, Ziegler unpubl.);
spinulosus Mertens, 1941 (some Solomon Islands: Sprackland 1994);
yuwonoi Harvey & Barker, 1998 (Halmahera, Moluccas).

V. indicus as the species described first and thus giving its name to the entire species group has by far the widest distribution: it ranges from Sulawesi in the west through the Moluccas, New Guinea and its offshore islands, the Bismarck Archipelago and the Solomon Islands to the Marianas, Caroline and Marshall Islands in the northeast, and reaching the northern coast of Australia in the south (Böhme et al. 1994, Eidenmüller 1997, Bennett 1998, Ziegler et al. in press).

Although Daudin's holotype of *V. indicus* has to be considered lost (Brygoo 1987, Böhme et al. 1994, Sprackland 1994, 1997), this taxon is defined by the combination of an entirely dark tongue and a whitish, unpatterned throat colouration with relatively low scale counts (Böhme et al. 1994): the so-called S (scales around midbody) and XY (transverse rows of dorsal scales from hind margin of tympanum to beginning of hindlegs) values ranging from 106-148* and 106-155 respectively.

The dorsal pattern of *V. indicus* consists of small, irregularly arranged light spots on a dark background and is subjected to considerable variation over the vast distribution area (e.g. Eidenmüller 1997, Bennett 1998). In regard to genital morphology, *V. indicus* is characterized by a unilateral differentiation of paryphasma rows only, as well in the hemipenes as in the hemiclitores (Ziegler & Böhme 1997). About 11 sharp tips are arranged in one row apically on the inner hemibacula (Ziegler & Böhme l.c.).

In order to reassess the identity of *V. indicus*, we studied material from the type locality Ambon (= Amboine, Amboina), Moluccas, from some neighbouring islands and from various parts of the remaining distribution area.

Material and methods

We used material from the following collections (in parentheses the respective acronyms): Natuurhistorisch Nationaalmuseum, Leiden (RMNH); Forschungsinstitut und Naturmuseum Senckenberg (SMF); Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn (ZFMK); Zoölogisch Museum, Universiteit van Amsterdam (ZMA); Museum für Naturkunde der Humboldt Universität Berlin (ZMB); Zoologisches Museum der Universität Hamburg (ZMH); Zoologische Staatssammlung München (ZSM); The acronym ZFMK (MZB) means a permanent loan of specimens by the Museum Zoologicum Bogoriense (MZB), Bogor, Indonesia, to the ZFMK.

Corresponding to the works by Brandenburg (1983), Böhme et al. (1994), Böhme & Ziegler (1997), Ziegler, Böhme & Philipp (1999) and Ziegler, Philipp & Böhme (1999), we took the following measurements, proportion indices and scale counts (the RMNH material was assigned by us morphologically in Leiden, the metric/meristic data were taken from Brandenburg l.c.):

1. Measurements (in mm):
SVL: snout vent length; D: head neck length (from tip of snout to gular fold); E: body length (from gular fold to cloaca); F: tail length (from cloaca to tail tip); TL: total length; A: head length (from tip of snout to anterior margin of tympanum); B: head width (maximum width between eyes and ears); C: head height (above the eyes); G: distance from anterior margin of eye to posterior edge of nostril; H: distance from anterior edge of nostril to tip of snout; I: distance from anterior margin of tympanum to anterior margin of eye;

2. Proportion indices:
1. relative tail length (F : [D+E]); 2: position of nostril between tip of snout and eye (G : H); 9: position of nostril to snout tip ([A-I] : G); 10: relative head length in relation to head width (A : B); 11: relative head length in relation to head height (A : C);

* The aberrant specimen with an S value of 170 and an XY value of 182 listed by Böhme et al. (1994) proved to be a representative of a new species: *V. caerulivirens* Ziegler, Böhme & Philipp 1999.



Fig. 1. Daudin's figure of *Tubinambis indicus*. Photo: K. M. Philipp.

3. scale counts:
P: scales from rictus to rictus; Q: scales around tail base; S: scales around midbody; T: transverse rows of ventral scales from gular fold to beginning of hindlegs; X: transverse rows of dorsal scales from hind margin of tympanum to gular fold; XY: X + transverse rows of dorsal scales from gular fold to beginning of hindlegs; c: supralabials (right + left side); m: scales around neck before gular fold; n: ventrals from tip of snout to gular fold.

Note the slightly different definition of the measurements G and H of Brandenburg (1983), so that his indices 2 and 9 are not fully comparable with ours.

Results and discussion

Our investigation of topotypic material from Ambon clearly revealed the sympatric existence of two markedly different Pacific monitor taxa, which differ in scalation, colour pattern and in tongue colouration:

Taxon 1: Tongue entirely dark pigmented. Temple without a light longitudinal band, but with irregularly set light, roundish spots (occupying the area of 4-6 scales each) instead. Dorsal pattern consisting of small, irregularly arranged light spots that comprise an area of 1-3 scales (exceptionally up to 5) only. Scale counts low.

Taxon 2: Tongue light, unpigmented, only in adults the tips of the tongue and a median, ill-defined area following the upper side of the bifurcation tend to become dark. From the lower eye lid to the upper margin of the tympanum a distinct, light, 1-4 scales wide temporal band, which is bordered on its upper and lower margins by dark, unpatterned areas. Dorsal pattern in juveniles consisting of light-centered ocelli, which may comprise 5-12 scales. In adults, a marked tendency to a cross-banded dorsal pattern. Moreover, particularly in the second half of the body and in the first third of tail the light scales are often arranged to form thin, oblique bars. Scale counts considerably increased as compared with taxon 1.

In order to decide on which of these two forms the name *V. indicus* (Daudin, 1802) can be applied – in the absence of the holotype: see above –, we tried to analyze the original description and the accompanying figure. According to Daudin (1802) the ground colour of his *Tupinambis indicus* (snout vent length 43 cm, tail length 53 cm) is basically black. The dorsal parts of neck, body and limbs, as well as of the cylindrical tail base, are covered by numerous whitish, irregularly scattered dots. The ventral side is of a shiny pale-grey. The tail is laterally compressed and bears a weakly expressed double keel on its upper margin. Daudin's (l.c.) description is supplemented by a figure, which we are reproducing here (Fig. 1). The dorsal pattern is drawn as consisting of small, irregularly scattered light spots, each covering an area of 1-2 scales. The head makes an angular impression and is illustrated without patterning. Also the text by Daudin (l.c.) does not refer to a particular head pattern, nor does it refer to the colouration of the tongue.

In view of this description and figure, we think that the less conflicting alternative is to relate Daudin's name to the first of the two taxa identified by us from the type locality Ambon (see above), viz. the dark-tongued form without a light temporal stripe (see also Harvey & Barker 1998), without light oblique body bands and bars and with the lower scale counts (Tab. 1, figs 2-4). This decision does not only fit the earlier concept of *V. indicus* (cf. Böhme et al. 1994), but also serves the main purpose of the ICZN (International Trust for Zoological Nomenclature 1985), which is anchored in its preamble, viz. stability. Therefore we redefine *Varanus indicus* (Daudin, 1802) within the meanwhile eight species of a clade of closely related forms by designating a neotype and supplementing the original description. The sympatric, second taxon occurring at its type locality Ambon and on some other neighbouring islands cannot be referred to any of the other 7 species (besides *V. indicus*) nor can it be identified with any of the available synonyms; therefore it is described below as a new species – the ninth! – within the *V. indicus* group.

1. *Varanus indicus* (Daudin, 1802)

Fig. 5

1802 *Tupinambis indicus* Daudin, Hist. nat. Rept., 3: 46. – Type locality: "Amboine" = Ambon, Moluccas.
1831 *Monitor chlorostigma* Gray in Griffith, Anim. Kingd., 9 Synops.: 26. – Type locality: Rawack island, north of Waigeo.
1883 *Varanus indicus* – Boulenger, Proc. zool. Soc. London, 1883: 386.
1926 *Varanus indicus rouxi* Mertens, Senckenbergiana, Frankfurt/M., 8: 276. – Type locality: Durdjela, Wammer, Aru islands.
1929 *Varanus tsukamotoi* Kishida, Lansania, Tokyo, 1: 13. – Type locality: Saipan, Caroline islands.
1942 *Varanus (Varanus) indicus* – Mertens, Abh. Senckenb. naturf. Ges., Frankfurt/M., 465: 154; 466: 263.
1985 *Euprepiosaurus rouxi* – Wells & Wellington, Aust. J. Herp. Suppl. Ser. (1): 21.
1988 *Varanus (Euprepiosaurus) indicus* – Böhme, Bonn. zool. Monogr. 27: 139.

Types. Neotype: ZFMK 70650, juvenile, Ambon (3°42'S; 128°10'E), Moluccas, Indonesia; leg. Tropeninstituut, Amsterdam.

Diagnosis. *V. indicus* is distinguished from all other members of the *V. indicus* group (*V. caerulivirens, V. doreanus, V. finschi, V. jobiensis, V. melinus, V. spinulosus, V. yuwonoi* and the new species described below) by the following combination of character states: (1) dorsal colour pattern consisting of irregularly scattered, small whitish to yellowish spots, mostly smaller than an area covered by 5 scales, on a dark-brownish or blackish background; (2) absence of a light, dark-bordered postocular/supratemporal stripe; (3) light unpatterned throat; (4) entire dark tongue; (5) low scale counts (S: 106-137, XY: 105-140; n = 36); (6) outer genital organs with unilaterally differentiated paryphasmata only.

Description of neotype

Habitus slender. Total length 263 (108+155) mm, length of hindlimb 42 mm. Nostril closer to tip of snout than to eye. Canthal ridge weakly expressed. Nasal region slightly swollen, with a median, longitudinal shallow groove. 6/6 enlarged supraoculars. Scale covering the pineal organ likewise enlarged, irregularly heptagonal with a round whitish blotch in the center. Scales on nape smooth, obliquely oval, gradually passing into the longitudinally oval dorsal scales. These anteriorly smooth, but from the second half of body towards the tail with slight keels. Gular and ventral neck scales smooth, the former being longish-rectangular, the latter roundish-oval. Ventrals slightly keeled, long-

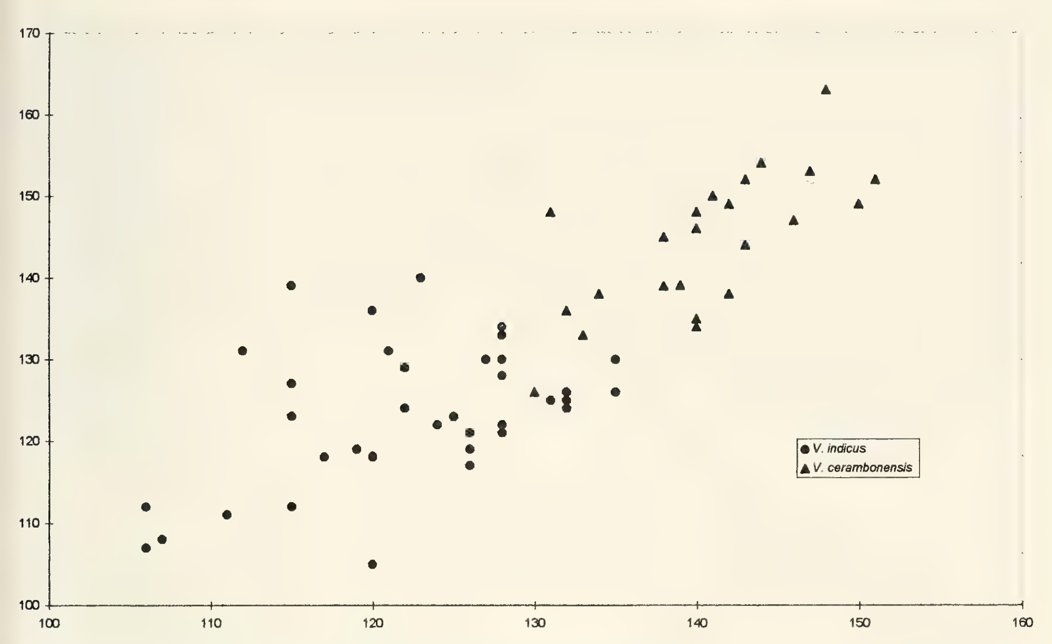


Fig. 2. Scale counts of *V. indicus* and *V. cerambonensis*, spec. nov; x-axis: S value (scales around midbody); y-axis: XY value (transverse rows of dorsal scales). Same animals as in tab. 1.

ish rectangular. Limbs covered with smooth, roundish-oval scales which may bear slight keels only dorsally. Caudal scales keeled above and below; a ventral oblique row corresponds to two rows of lateral scales – similarly as in the body scales. The two median rows of dorsal tail scales are forming a double crest from the first sixth of the tail backwards. Next to the scales of palms and soles most other scales bear at least the apical pit posteriorly. The head scales have a considerable number of these pits which are scattered over the entire scale. Scale counts, measurements and proportion indices of the neotype are as follows: P: 38, Q: 68, S: 111, T: 82, X: 29, XY: 111, c: 52, m: 79, n: 70, A: 23.6, B: 13.4, C: 19.1, D: 44, E: 64, G: 6.0, H: 4.5; 1: 1.42, 2: 1.33, 10: 1.76, 11: 2.59.

Tab. 1. Comparison of scale counts of *V. cerambonensis*, spec. nov. and *V. indicus* (var: variation, m: mean, s: standard deviation; for other abbreviations see material and methods). For the statistical calculations of *V. cerambonensis*, spec. nov. we used the whole type series and all voucher material listed under further material. For the calculations of *V. indicus* we used the following voucher material, that due to the dark tongue pigmentation, the irregular dorsal pattern, the light unpatterned throat and the lacking of a light coloured temporal stripe could cleary be assigned to *V. indicus*:
RMNH 3151: Rawack; RMNH 3190 a-b: Ternate; RMNH 3800: Batjan; RMNH 7168: Aru Islands; RMNH 21045: Japen; SMF 11584: Aru Islands; ZFMK 19225-26: Aru Islands; ZFMK 70650 (neotype): Ambon; ZMA 10194/11-12: Nort river, Irian Jaya; ZMA 10202: Alkmaar, Irian Jaya; ZMA 11146 C: Ambon; ZMA 15414: Ternate; ZMA 15417: Ternate; ZMB 24869: holl. NG; ZMH R 04728: Hermit Island, PNG; ZMUC R 4266: Bonin Islands, Japan; ZSM 6/1970/43, ZSM 6/1970/49, ZSM 7/1970/224-225, ZSM 15/1970/195, ZSM 15/1970/221-223, ZSM 15/1970/288, ZSM 15/1970/290: all Aird Hill, PNG; ZSM 9/1970/331: Mt. Bosavi; ZSM 10/1970/323 and 328: Kikori, PNG; ZSM 12/1970/78: Papua Golf, PNG; ZSM 14/1970/129: Mt. Bosavi; ZSM 13/1970/113: St. Joseph river, PNG; ZSM 15/1970/315: Port Moresby, PNG.

		P	Q	S	T	X	XY	c	m	n
V. cerambonensis	var	41-54	74-91	129-150	90-102	34-46	126-163	47-57	83-110	78-97
	m±s	48±3.9	83±4.9	140±5.9	96±3.1	39±3.2	145±8.2	53±2.7	98±7.6	86±4.7
V. indicus	var	36-46	58-85	106-137	74-107	25-41	105-140	49-56	70-94	67-92
	m±s	41±2.5	76±6.0	123±7.9	88±6.1	34±4.1	124±8.7	53±1.6	82±5.7	79±5.5



Fig. 3. Comparison of dorsal pattern of adult *V. indicus*, above (ZSM 10/1970/1) and *V. cerambonensis*, spec. nov., below (ZFMK (MZB) 70619 paratype). Photo: K. M. Philipp.

Colour (in preservative): Upper side of head, neck, back, limbs and tail basically dark-brownish/blackish; lower parts whitish-yellowish. Frenal region of head yellowish with dark greyish-brown vertical bars which continue down to the lower jaws. Eyelids whitish-yellowish. Tympanum anteriorly encircled by a whitish-yellowish line. Along the lateral skinfolds of the neck a narrow whitish-yellowish line. Upper parts of neck, back and limbs with numerous small, round spots covering ca. 1-3 scales (exceptionally up to 5), which tend to form irregular oblique rows mostly on the back. Sides of tail in the proximal third with vertical rows of whitish-yellowish roundish spots that increase their size posteriorly and fuse with each other. From the second third backwards the tail bears marked light and dark crossbands. The dark bands, being interrupted by a light stripe each, are approximately as double as wide as the light bands. Lower parts whitish-yellowish, with indistinct light brown crossbars on venter and tail that disappear medially. Throat only marginally with brown bars, medially whitish like the remaining lower side of the neck. No traces of blue colouration detectable. Outer genitals not prepared.

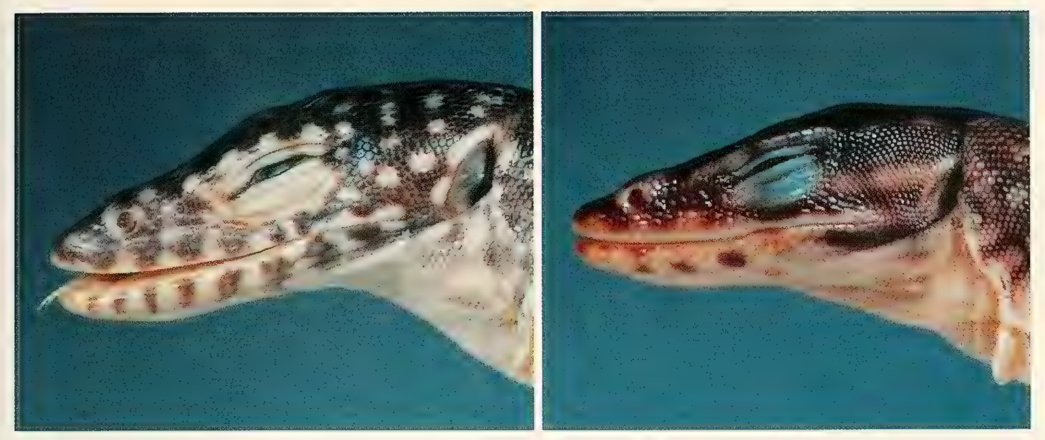


Fig. 4. Comparison of lateral head view of juvenile *V. indicus*, left (ZFMK 70650) and *V. cerambonensis*, spec. nov., right (ZFMK 70651). Photos: K. M. Philipp.

Fig. 5. Neotype of *V. indicus* (ZFMK 70650). Left: dorsal view; right: ventral view. Photos: K. M. Philipp.

Distribution. According to Böhme et al. (1994) *V. indicus* is distributed on Sulawesi, the Moluccan islands Morotai, Ternate, Halmahera, Obi, Buru, Ambon, Haruku and Seram, on the Kai Islands and on New Guinea with its offshore islands Salawati, Weigeo, Biak and Japen. Moreover, *V. indicus* occurs on the Bismarck Archipelago islands New Britain, New Ireland and Duke of York, and on the Solomon islands Bougainville (PNG) and Guadalcanal. *V. indicus* is also known from Ysabel Island, Solomons (Sprackland 1994). In the course of our present studies we were able to record true *V. indicus* also from Hermit Island (Papua New Guinea; ZMH R 04728), and from the Japanese Bonin Islands = Ogaswara gunto (ZMUC R 4266). The Bonin record represents the northernmost occurrence of *V. indicus* (and any other Pacific monitor), although in this case an anthropogenic transport cannot be excluded. There is

also a problem as to the occurrence of *V. indicus* on Sulawesi. Boulenger (1885) and Böhme et al. (1994) are listing voucher specimens for this island, however, some Indonesian herpetologists and animal dealers deny such an occurrence (Iskandar & Nio 1996, Yuwono 1998). Finally, the records given by Böhme et al. (1994) and listed above in this paper, were evaluated before the taxonomic recognition of the new species described below. Therefore, some of their Moluccan island records may actually be based on vouchers of this new species. In conclusion, we feel it necessary to continuously evaluate the vaste distribution area of *V. indicus*, particularly at its periphery.

Habitat and life habits. First field observations unequivocally referring to *V. indicus* have been made by Philipp (1999) in Irian Jaya. The species proved to be rather eurytopic, occupying a wide variety of habitats, being most common in forest types influenced by saltwater: littoral bush, littoral forest and mangrove forest. It was less commonly observed in areas not influenced by saltwater, such as gallery forests or lowland rain forests. *V. indicus* proves to be well adapted to (salt)water, foraging often extremely close to water and fleeing even often into the water. Böhme et al. (1994) stress that *V. indicus* may be also associated with human settlements.

Systematic relationships. According to Ziegler & Böhme (1997) *V. indicus* is a member of the subgenus *Euprepiosaurus* (Fitzinger, 1843), above all by the asymmetrical sperm groove of its outer genitals which is highly autapomorphic for this taxon. Within *Euprepiosaurus* the *V. indicus* group (with *V. indicus* as the species described first and thus giving its name to the entire species group) is characterized by the autapomorphic reduced paryphasmata, which are however much more differentiated than in the *V. prasinus* group. The only unilateral development of the parayphasmata in the outer genitals of *V. indicus*, as well as in those of *V. caerulivirens*, *V. melinus* and of the new species described below is clearly a reduced and therefore derived condition as compared with the bilaterally developed asulcal paryphasmata in the organs of *V. doreanus*, *V. finschi*, *V. jobiensis* and *V. yuwonoi* (see Böhme & Ziegler 1997, Ziegler & Böhme 1997, 1999, Ziegler, Böhme & Philipp 1999, Ziegler, Philipp & Böhme 1999). Furthermore the low scale counts of *V. indicus* have to be interpreted as derived (e. g. Mertens 1942, Böhme et al. 1994). Also the existence of a dark pigmented tongue (Fig. 6) could be interpreted as the derived condition, but further studies concerning possible adaptive influences are still required (see

Tab. 2. Measurements and proportion indices of *V. cerambonensis*, spec. nov. Abbreviations see material and methods.

		1	2	9	10	11	SVL	D	E	F	A	B	C	G	H
ZFMK (MZB) 70617	Seram	–	1.5	–	1.7	2.6	409	159	250	575+	72.9	42.1	27.9	21.7	15
ZFMK (MZB) 70618	Seram	1.7	1.6	–	2.1	2.7	307	117	190	535	59.3	28	21.8	17.7	11
ZFMK (MZB) 70619	Seram	1.6	1.6	–	1.8	2.5	283	113	170	445	55.5	30.3	22.4	17.2	11
RMNH 3189	Seram	–	1.47	1.60	1.94	2.43	–	–	–	–	–	–	–	–	–
ZFMK 70651	Ambon	1.52	1.17	1.77	1.88	2.61	98	41	57	150	23.4	11.9	8.7	5.6	4.6
ZMA 11146 A	Ambon	1.60	1.25	1.73	1.83	2.75	139	54	85	225	27.9	15.3	10.5	7.2	5.4
ZMB 4848	Ambon	1.49	1.40	–	2.30	3.06	233	86	147	347	42.8	18.6	14	11.5	8.2
RMNH 3150	Ambon	–	1.33	1.75	2.00	2.62	–	–	–	–	–	–	–	–	–
RMNH 3152	Ambon	1.51	1.22	1.71	2.17	2.63	–	–	–	–	–	–	–	–	–
RMNH 7196	Ambon	–	1.38	1.70	1.89	2.87	–	–	–	–	–	–	–	–	–
RMNH 7297a	Ambon	1.61	1.29	1.66	2.00	2.80	–	–	–	–	–	–	–	–	–
RMNH 7297b	Ambon	–	1.17	1.82	2.00	2.76	–	–	–	–	–	–	–	–	–
RMNH 7297c	Ambon	–	1.29	1.71	2.04	2.72	–	–	–	–	–	–	–	–	–
RMNH 7297d	Ambon	1.43	1.31	1.76	2.00	2.94	–	–	–	–	–	–	–	–	–
RMNH 7297e	Ambon	1.32	1.24	1.75	2.00	2.88	–	–	–	–	–	–	–	–	–
RMNH 7297f	Ambon	1.54	1.36	1.72	2.00	2.83	–	–	–	–	–	–	–	–	–
RMNH 7297g	Ambon	–	1.32	1.70	1.92	2.79	–	–	–	–	–	–	–	–	–
RMNH 7297h	Ambon	–	1.35	1.79	2.07	2.88	–	–	–	–	–	–	–	–	–
ZMH R 04731	Banda	1.3	1.1	–	2.1	2.8	109	44	65	146	23	11.2	8.2	5.3	4.7
RMNH 7223	Buru	1.4	1.3	1.75	1.9	2.7	–	–	–	–	–	–	–	–	–
ZMA 15416	Buru	1.5	1.3	–	2	2.8	252	94	158	380	45	22.7	16	11.4	8.8
RMNH 3184	Obi	1.5	1.2	1.85	1.9	2.6	–	–	–	–	–	–	–	–	–
ZMB 53470	"Neuguinea"	1.4	1.2	–	2	2.8	103	42	61	147	22	11.2	8	5.2	4.3

Böhme et al. 1994, Ziegler, Böhme & Philipp 1999). Also the lack of blue pigmentation especially on the tail of *V. indicus* seems to be derived (Böhme et al. 1994). All voucher specimens that could be unequivocally assigned to *V. indicus* by us are lacking any blue pigmentation in their colour pattern, particularly at the tail. Böhme et al. (1994) and Harvey & Barker (1998) refer to juvenile specimens of *V. indicus* with blue (tail) pigment, however, they do not refer to voucher material. At the moment, we believe that *V. indicus* is generally lacking blue pigment, even in juvenile tails, so that the specimens referred to by the above authors, may be representatives of other species.

However, further investigations including molecular ones are necessary to resolve the exact systematic relationships within the *V. indicus* group.

2. *Varanus cerambonensis*, spec. nov.

Fig. 10

Types. Holotype: ZFMK (MZB) 70617, adult male, Laimu (3°19'S; 129°44'E), south coast of Seram (= Ceram), Moluccas, Indonesia; lowland rainforest with adjacent gardens; leg. H. Kotter, 41./42. week 1996. – Paratypes: ZFMK (MZB) 70618-619, same locality data as holotype. RMNH 3189, Seram, Papoerik bay, leg. Ludeking 1863; ZFMK 70651, Ambon, leg. Tropeninstitut, Amsterdam; ZMA 11146 A, Ambon, leg. Tropeninstitut, Amsterdam; RMNH 7297 (seven specimens and one head), Ambon, leg. 1866; RMNH 3150, 3152 & 7196, Ambon, leg. S. Müller & H. Macklot 1827; ZMB 4848, Ambon, leg. Martens.

Diagnosis. A sibling species of *V. indicus* that can be distinguished from all other members of the *V. indicus* group by the following combination of characters:

(1) A dark coloured dorsum, lacking any blue elements; (2) banded dorsal pattern in adults; (3) dorsal pattern of juveniles consisting of light-centered ocelli (light spots comprise 5-12 scales); (4) a light, 1-4 scales wide temporal stripe which is bordered above and below by dark bands; (5) a light, unpatterned throat; (6) lack of blue pigmentation on the tail; (7) entire light-coloured tongue in juveniles, in adults tips of tongue and a median, ill-defined area following the upper side of the bifurcation point dark, indicating an ontogenetic shift of tongue-pigmentation; (8) low scale counts (S: 129-150, XY: 126-163; n = 23); (9) genital organs with only unilaterally differentiated paryphasma

Tab. 3. Scale counts of *V. cerambonensis*, spec. nov. Abbreviations see material and methods.

		P	Q	S	T	X	XY	c	m	n
ZFMK (MZB) 70617	Seram	45	90	138	97	38	139	53	88	97
ZFMK (MZB) 70618	Seram	41	79	132	94	35	133	54	90	85
ZFMK (MZB) 70619	Seram	41	88	129	90	34	126	47	87	82
RMNH 3189	Seram	53	91	150	96	35	152	53	100	91
ZFMK 70651	Ambon	53	85	150	102	41	149	51	96	89
ZMA 11146 A	Ambon	51	81	147	101	46	163	50	99	84
ZMB 4848	Ambon	50	86	143	99	34	144	48	89	90
RMNH 3150	Ambon	54	82	142	97	40	138	56	110	86
RMNH 3152	Ambon	51	89	143	100	43	154	55	110	90
RMNH 7196	Ambon	51	88	141	96	43	149	55	96	88
RMNH 7297a	Ambon	48	89	140	96	38	150	52	105	86
RMNH 7297b	Ambon	47	81	140	95	40	146	56	100	83
RMNH 7297c	Ambon	44	78	138	93	42	145	51	108	79
RMNH 7297d	Ambon	52	85	142	94	40	152	56	104	84
RMNH 7297e	Ambon	48	80	138	93	40	139	57	104	81
RMNH 7297f	Ambon	51	79	131	95	38	148	56	101	79
RMNH 7297g	Ambon	50	87	146	100	38	153	52	105	85
RMNH 7297h	Ambon	45	–	–	–	–	–	55	–	–
ZMH R 04731	Banda	49	78	131	96	37	136	52	99	88
RMNH 7223	Buru	46	79	145	95	40	147	53	95	78
ZMA 15416	Buru	41	74	140	96	34	135	51	83	82
RMNH 3184	Obi	43	75	133	93	37	138	57	91	93
ZMB 53470	"Neuguinea"	47	82	143	102	42	144	52	103	89

Fig. 6. Tongue-flicking adult *V. indicus* in its habitat, photographed in Kokas, Irian Jaya, Indonesia. Photo: K. M. Philipp.



Fig. 7. Adult *V. cerambonensis*, spec. nov. in its habitat (Mosso, Seram, Indonesia). Photo: H. Kotter.

Fig. 8. Juvenile *V. cerambonensis,* spec. nov. in its habitat (Seram, Indonesia). Photo: H. Kotter.

Halmahera
Obi
Irian Jaya
Sulawesi
Seram
Buru
Ambon
Banda Islands
Kai Islands

Fig. 9. Distribution of *V. cerambonensis,* spec. nov.

rows; (10) terminally on the inner, bigger hemibacula more than 20 pointed tips that are arranged in two rows.

V. cerambonensis spec. nov. differs from sympatric *V. indicus* mainly by the banded dorsal pattern, the light temporal stripe, the constantly different tongue colouration and the higher scale counts (in particular the S and XY values, see tab 1). Juveniles of *V. cerambonensis* spec. nov. differ from juveniles of *V. indicus* by the much larger light spots on the dorsal side (in *V. cerambonensis* spec. nov. the light spots comprise 5-12 scales, while in *V. indicus* they comprise 1-3 – exceptionally up to 5 – only), the light temporal stripe, the light tongue and the higher scale counts.

Description of holotype

Habitus slender. Total length 940 mm (snout-vent-length 380 mm, tail length 580+x mm. Length of hindlimb 180 mm. Nostril closer to tip of snout than to the eye. Canthal ridge expressed. Nasal region swollen, with a median, longitudinal concave, shallow groove. Supraoculars 5 (left) and 6 (right), all distinctly broader than long, with the exception of the hindmost one on the left side which is almost as long as broad. Scale covering the pineal organ enlarged, pentagonal, darkened towards the margins with a yellowish-whitish centre. Dorsal neck scales anteriorly roundish to ovally broadened, with a varying number of pits (commonly 3-6) concentrated on the posterior margin of each scale; posteriorly, the shape of the scales becomes more longish, surrounded by minute intercalary granules. Dorsal scales similar to posterior neck scales, but distinctly broader, with normally 1-3 posterior grooves. From midbody most scales with a weak keel that becomes more distinct towards the tail. Gular scales longish, oval, with generally 1-3 pits at their hindparts; chest scales larger, largest at the anterior part of the chest. Ventral scales longish, hexa- to octogonal, giving a rectangular appearance, with an ill-defined posterior pit; juxtaposed, so that interstitial granules can be observed at their hindmargins only. Around the cloaca, the number of pits increases drastically, up to 20 per scale. This is maintained on the ventral scales of the tail base, the number of pits per scale decreasing again towards the tail tip, where only 1 pit is observed. Dorsal part of tail covered with rectangular, weakly keeled scales, the keeling becoming more indistinct towards the tail. Upper crest of tail with a double, strong longitudinal keel. Limbs covered dorsally with oval to longish, high-domed scales with usually one pit each at their hindmargin. For further measurements, proportion indices and scale counts see tab. 2 and tab. 3.

Everted hemipenis ca. 3.5 cm long, club-shaped, apically strongly and asymmetrically broadened; lower truncal and pedicellar region weakly pigmented with melanophores. Sperm groove running obliquely towards the outer of the two apical lobes, where it terminates at the base of the outer hemibaculum. Outer sulcal lip stronger than the inner one. At the tips of the two apical lobes the two stiff, hardened hemibacula are emerging, covered by a thin layer of tissue. The inner, apically directed hemibaculum is concave towards the sulcal plane and apically broadened, bearing 23 sharp tips terminally, that are arranged in two rows. The outer, smaller and more laterally directed hemibaculum terminates in two pointed processes. Ca. 22 rows of paryphasmata are running to the outer lobe only, nearly encircling the outer hemibaculum. Truncal and pedicellar area smooth, without ornamentation (terminology after Ziegler & Böhme 1997).

Ground colour (in preservative) of the upper parts of head, neck, dorsum, limbs and tail dark brownish to black , with light, yellowish-whitish patterning. Underparts light yellowish-white, almost without any darker pattern. Only the marginal parts of throat, belly and underside of limbs with an indistinct greyish, clouded pattern. Head dark brown on the top and the sides, with irregular light spotting. A ca. 2 scales wide light stripe runs from the lower eyelid towards the upper margin of the tympanum, bordered by a dark, unspotted, 2-3 scales wide dark band on the upper and the lower margin. Tongue with a complex colour pattern: outermost tip of the tines yellow-brownish, passing dorsally to grey-brownish; tongue body dorsally grey-brownish to black, passing laterally by an irregular border to the yellowish-whitish underside of the tongue, which changes ventrally only at the tips of the tines towards a greyish-brown colouration. Nape very dark, with light spots which partly comprise only a part of one single scale. Towards the sides of the neck, the spots become more intensive, occupying entire scales. On the dorsum, the light spots are arranged in oblique areas of changing density, thus creating a cross-banded colour pattern; between fore- and hindlimbs five such lighter crossbands. Particularly in the second half of the body, the light spots are often arranged in thin crossbars, which can be traced also on the upper side of the tail. No blue pigmentation recognizable.

Variation of paratypes: The adult paratypes are largely corresponding to the description of the holotype. Also both hemipenes of ZFMK (MZB) 70618 agree with the respective character states

observed in the holotype. There are only 20 paryphasman rows surrounding the outer hemibacula, and the inner hemibacula bear terminally 24 tips being arranged in two rows.

The juvenile representatives of the new species are well agreeing among each other, but show some differences as compared with the adults. Their dorsal pattern consists of irregular oblique rows which are composed of round, black ocelli, which contain light, yellowish-whitish centers occupying 5 to 12 scales each. Their temples bear the characteristic light band which is ca. 4 scales wide and even more contrasting than in adults. Tongue colouration uniformly light. Both subadult specimens (ZMA 11146 A and RMNH 3189) have light tongues, where only the tips of the tongue and a thin median stripe on the tongue body are grey-coloured. This indicates an ontogenetic shift of the tongue colouration.

Additional material. Specimens assignable to *V. cerambonensis* spec. nov. are: RMNH 7223, Buru, leg. D.J. Hoedt 1863; RMNH 3184, Obi, leg. H.A. Bernstein 1862; ZMA 15416, Buru, leg. L.J. Toxopeus 1921; ZMH R04731, Banda Islands; ZMB 53470, "Neuguinea", "through Hamburg Museum". Moreover, we have some colour slides of living *V. cerambonensis* spec. nov. at our disposal (see figs 7, 8), made by H. Kotter on Seram, which give an impression of the colouration in life.

Etymology. The specific epithet is derived from the two southern Moluccan islands Ceram (= Seram) and Ambon, from where our type series is originating.

Distribution. *V. cerambonensis* spec. nov. is presently known from the Moluccan islands Seram (type locality), Ambon, Buru, Obi and from the Banda Islands. Moreover, there is one ZMB specimen from "Neuguinea" (see above) without specific locality data, which strongly needs confirmation (fig 9).

Habitat and life habits. There are only few preliminary data collected with the Seram vouchers of the type series. These have been collected in lowland rainforest with adjacent gardens (Kotter, pers. comm.). Photos taken by H. Kotter (ZFMK slide archives and figs 7, 8) show individuals closely associated with freshwater streams. At the same site, also *Hydrosaurus amboinensis* was recorded by him (ZFMK vouchers).

A coexistence with *V. indicus* has been proven for Ambon. It still has to be demonstrated for Seram where it would well be possible that also in the case of these two sibling species *V. indicus* is the one occupying the more coastal, saltwater-influenced niche, whereas *V. cerambonensis*, spec. nov. would be the species associated more with lowland rainforest and freshwater. Field studies are highly desirable.

Systematic relationships. Genital-morphological characters clearly relate *V. cerambonensis* spec. nov. to the subgenus *Euprepiosaurus* and, within this taxon, to the *V. indicus* group (see Ziegler & Böhme 1997). The only unilaterally developed paryphasmata link the new species with *V. caerulivirens*, *V. indicus* and *V. melinus*, whereas a bilateral presence of paryphasmata is observed in *V. doreanus*, *V. finschi*, *V. jobiensis* and *V. yuwonoi*. Clearly, the reduced, unilateral development represents the derived condition (Ziegler & Böhme 1997).

Also, the relatively low scale counts (S: 129-150, XY: 126-163) of *V. cerambonensis* spec. nov. argue for a derived condition, but not to such an extent as in *V. indicus* (Böhme et al. 1994, Böhme & Ziegler 1997). The same seems to be true for the lack of blue pigmentation and the partly pigmented tongue (Böhme et al. 1994, Böhme & Ziegler 1997, Ziegler, Böhme & Philipp 1999). Most probably, in *V. cerambonensis* spec. nov. it concerns the first case of an ontogenetic change in tongue colouration. The possible adaptive influence and therefore related taxonomic value of tongue colouration requires further investigation.

Further investigations, including a molecular approach, have to be carried out to resolve the systematic relationships of the new species and its many siblings within the Pacific monitor species group.

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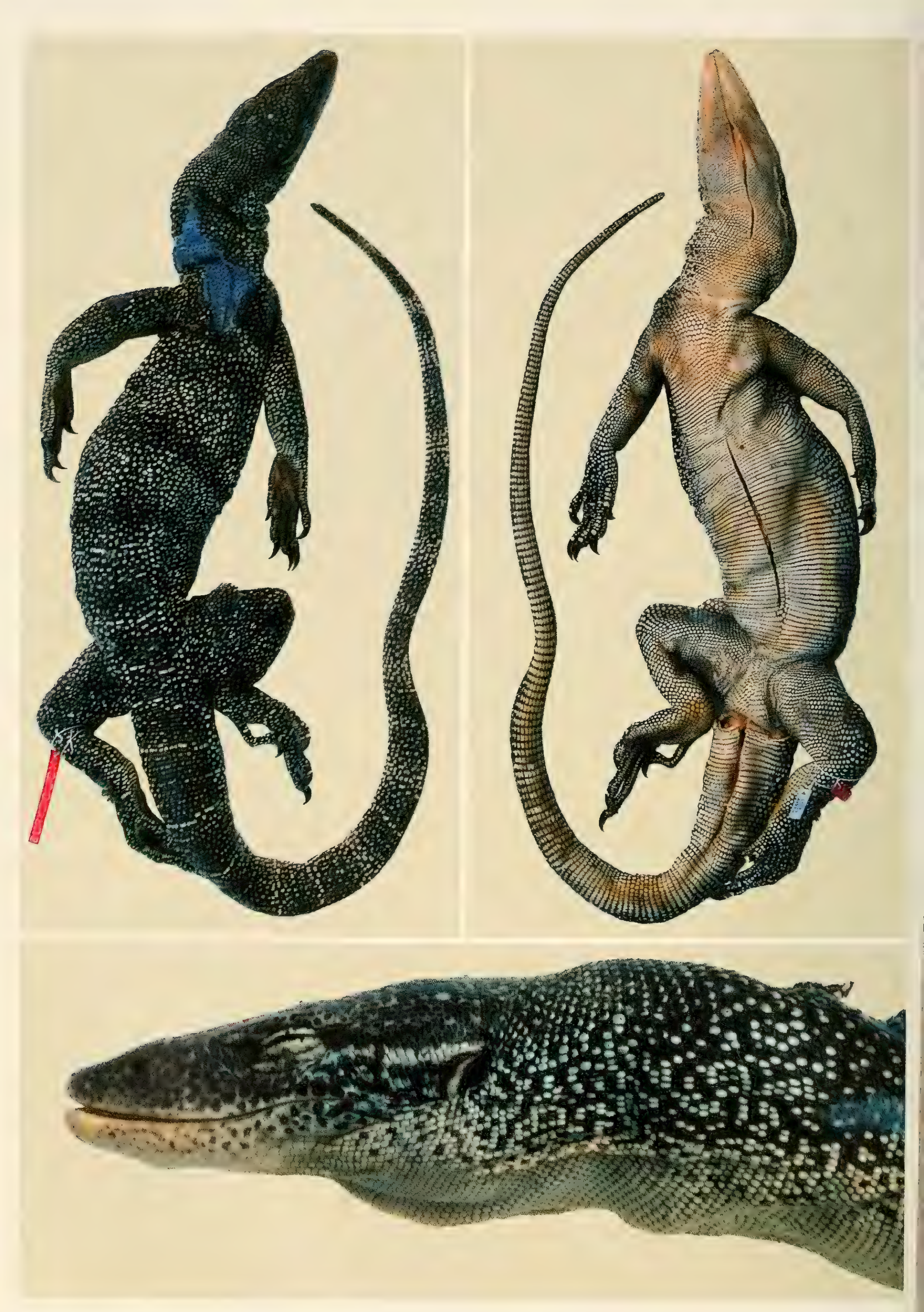


Fig. 10. Holotype of *V. cerambonensis*, spec. nov. (ZFMK (MZB) 70617). Left: dorsal view; right: ventral view; below: lateral view of head. Photos: K. M. Philipp.

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46. Nietzke, G. (unter Mitarbeit von P. M. Kornacker, A. Nöllert & H. Schmidt): Die Terrarientiere 2. Schildkröten, Brückenechsen und Echsen. – Ulmer Verlag, Wiesbaden, 1998, 366 S., 196 Farbphotos, 39 Zeichnungen. ISBN 3-8001-7179-1.

Nach vielen Jahren des Wartens erschien 1998 endlich der hier zu besprechende zweite Band des auf drei Bände geplanten Werkes, das nunmehr die vierte Auflage des Terrarienbuch-Klassikers "Nietzke"darstellt. Wie schon im ersten Band gliedert sich das Buch in einen einführenden Teil (der diesmal Themen wie Terrarienbepflanzung, Freilandterrarien sowie verschiedene Aspekte der Ökologie, Verbreitung, Reproduktion von Amphibien und Reptilien umfaßt) und einen Hauptteil, in dem ausgewählte Terrarientiere vorgestellt werden. Diesen Artbesprechungen sind jeweils einführende Kapitel zu Schildkröten und Echsen vorangestellt. Nachgegliedert ist ein kurzer Abschnitt über Literaturbeschaffung, ein Verzeichnis wichtiger zoologischer/herpetologischer Zeitschriften und Gesellschaften sowie ein Glossar. Zahlreiche durchweg gute Farbphotos und Textabbildungen runden das Buch ab.

Dem Gesamtwerk hoch anzurechnen ist neben der immensen Informationsfülle seine ausgesprochene Detailfreudigkeit und Aktualität. Wie schon im ersten Band sind die Artbearbeitungen fachlich fundiert und umfassend und darüberhinaus zumeist durch wichtige Literaturzitate ergänzt, die dem Leser einen leichten Zugang zu Originalarbeiten ermöglichen. Als Beispiele für die hohe Praxisorientierung des Buches wären hier z.B. eine Futterpflanzen-Tabelle für Landschildkröten (S. 82), eine Tabelle über die Zusammensetzung verschiedener Futterarten (S. 83), und die immer wieder in die Texte eingeflochtenen praktischen Erfahrungen und Erlebnisse der Autoren zu nennen. Ein Novum für die terraristische Literatur stellt der Abschnitt über Vorgehen und Möglichkeiten bei der Literatursuche und -beschaffung dar.

Die Auswahl der im speziellen Teil vorgestellten Arten wird schon im Vorwort als subjektiv bezeichnet. Trotzdem soll dieser Punkt auch hier kurz angesprochen werden. Es fällt auf, daß einige Arten aufgeführt sind, die keinerlei terraristische Bedeutung haben (z.B. *Ablepharus kitaibelii, Chalcides bedriagai, Blanus cinereus, Laudakia lehmanni,* eine 4 ½ Seiten umfassende tabellarische Darstellung wenig importierter *Ameiva*-Arten, der kaum terraristische Informationen entnommen werden können), dagegen sucht man andere inzwischen gut eingeführte, regelmäßig nachgezogene und spektakuläre Terrarientiere vergebens (z.B. *Omanosaura jayakari, Chlamydosaurus kingi, Uroplatus*-Arten). Warum die nun wirklich terraristisch irrelevante Brückenechse sogar in den Titel einbezogen wurde, bleibt unverständlich: Im Buch ist ihr lediglich eine knappe Seite mit allgemeinen Informationen gewidmet. Insgesamt hätte sich durch eine sorgfältigere Artenauswahl der Anwendungsbezug des Buches wohl noch steigern lassen.

Wie so häufig steckt auch hier der Teufel im Detail. Insgesamt werden die gute Konzeption und die fachliche Aktualität des Buches durch nicht wenige kleinere Unschönheiten etwas geschmälert. Dies gilt für die wenig erhellenden Darstellungen der Verbreitung der *Phelsuma*-Arten (S. 282-283), für teils fehlende Tabellenunterschriften, die eine Erklärungssuche im Text notwendig machen (z.B. Seiten 46, 47, 55, 175) sowie für Sätze wie "Am weißen Plastron sind oft nur die xiphiplastralen Callositäten sichtbar." (*Dogania subplana*, S. 110). In diesem Fall hilft auch das umfangreiche Glossar nicht mehr weiter. Solche schwer verständlichen Formulierungen gehören nicht in ein Buch, daß sich an einen weiten Leserkreis wendet. Bei nur flüchtiger Durchsicht fielen mir auch einige echte Fehler auf, die leicht hätten vermieden werden können: Die in der Tabelle auf S. 81 angegebene Eizahl von 104 bei *Malacochersus tornieri* ist um eine Zehenerpotenz zu hoch. Bei *Mauremys caspica* wurde ein neuer Unterartname geschaffen ("*M. caspica schiras*"), der nun infolge einer fehlenden Diganose als Nomen nudum zu betrachten ist. *Acanthodactylus erythrurus* wird im Verzeichnis der Tiernamen zu *A. erythrusus*. *Anguis peloponnesiacus* wird nicht als eigene Art angesehen (wie unter *A. fragilis* aufgeführt) sonderen als Synonym von *A. cephallonicus*. *Chamaeleo chamaeleon musae* lebt nicht auf der Arabischen, sondern auf der Sinai-Halbinsel. Bei der Auflistung der Verbreitung von *Podarcis muralis muralis* wurde deren Vorkommen in Deutschland (Inntal) vergessen. Die Autoren der beiden *Teira dugesii*-Unterarten *jogeri* und *selvagensis* sind nicht Osenegg & Mayer, sondern Osenegg, Bischoff & Mayer. Da beide Taxa als Unterarten von *Podarcis dugesii* beschrieben wurden, gehören nach der Zuordnung zum Genus *Teira* die Autoren und das Beschreibungsjahr geklammert.

Fazit: Für den Terrarianer aufgrund seiner Informationsfülle unverzichtbar und nach wie vor das Standardwerk, aber genau angesichts dieser Position (und nicht zuletzt auch wegen des hohen Preises) hätte man eine sorgfältigere Endredaktion erwarten können.

M. Franzen

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